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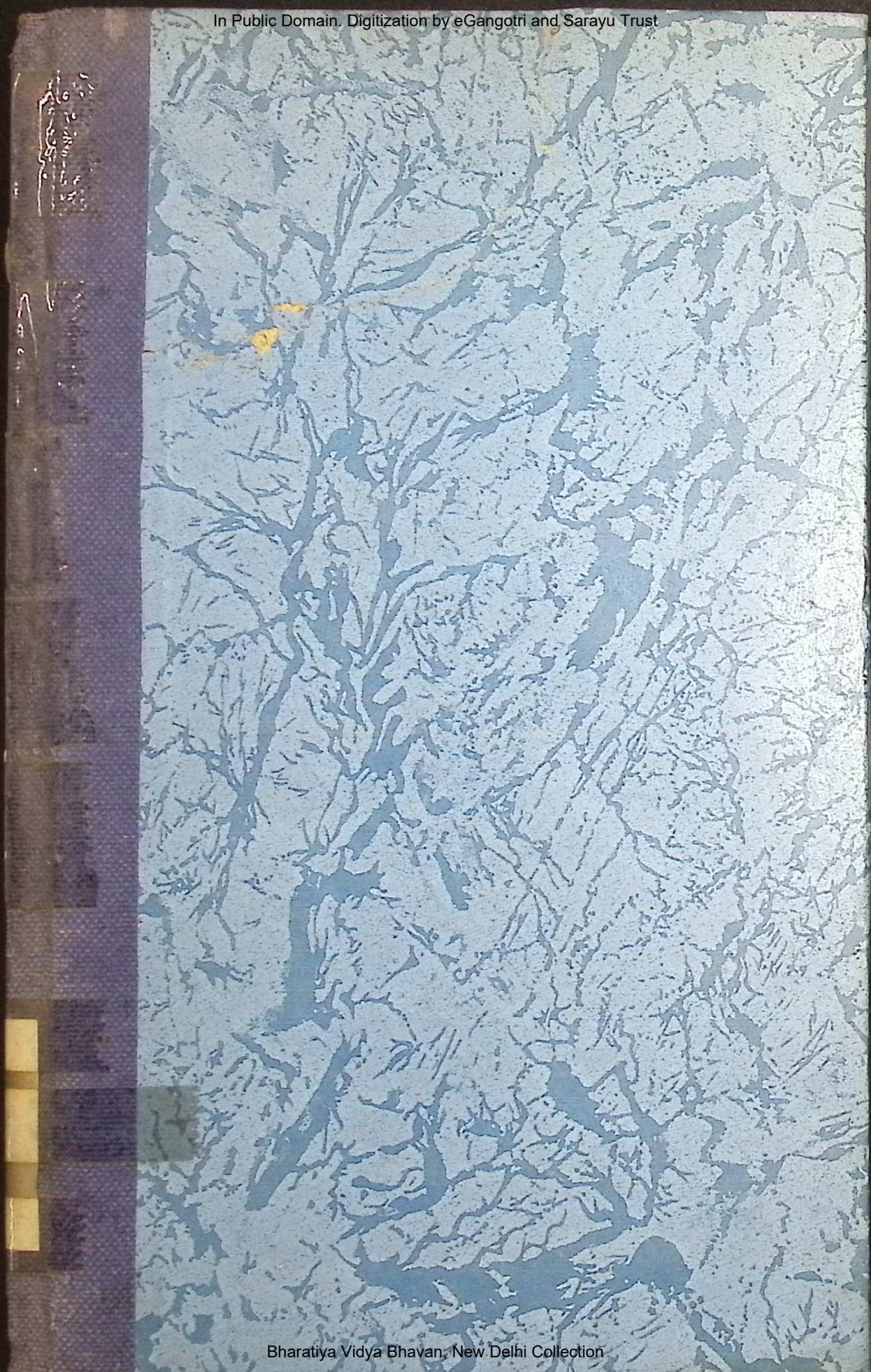

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PRELIMINARY TECHNO ECONOMICAL SURVEY OF NATURAL RESOURCES AND HERBAL WEALTH OF LADAKH

CENTRAL COUNCIL FOR RESEARCH IN INDIAN MEDICINE AND HOMOEOPATHY, NEW DELHI-110024.
(Ministry of Health & Family Welfare)
Government of India

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Preliminary Techno Economical Survey of Natural Resources and Herbal Wealth of Ladakh

CENTRAL COUNCIL FOR RESEARCH IN INDIAN MEDICINE AND HOMOEOPATHY
NEW DELHI-110024.

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Preliminary Techno Economical Survey of Natural Resources and Herbal Wealth of Ladakh

Edited by
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NEW DELHI-110024.

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Preface, Prologue and Contents

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PREFACE FOR THE SECOND EDITION

The Central Council for Research in Indian Medicine and Homoeopathy has pleasure to bring out a second edition of the report on 'Techno-economic survey of natural resources and herbal wealth of Ladakh' which was first released in 1976. The report, though a preliminary one, provided abundant information relating to flora and fauna, religio-social custums and beliefs, medical practices, besides glimpses of histori-co-geographical details of Ladakh. The report attracted the attention of scientists in various Science Congresses and Academies and was well received by the scientific and research workers in different fields. Considering the demand and with a view to place before the scientific world the Central Council for Research in Indian Medicine and Homoeopathy felt that there is an immediate responsibility to meet the imminent demands and so this edition.

Subsequent to bringing out of the first edition, efforts were made by the Council to have most of the plant, mineral and other material identified by further studies and this information is also incorporated in this revised edition. In the process of revision, the Council has had the valuable advice and guidance of Pandit Shiv Sharma and Prof. A.N. Namjoshi who keenly encouraged and desired that this work should be brought out at the earliest. They

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further desired that the copias of reports on the work carried out in Andaman and Nicobar islands, Aurnachal Pradesh etc. which are almost exhausted also be brought out incorporating further information gathered in the meantime.

This revised edition which incorporates additional information based on the guidance and suggestions received from different quarters together with up-to-date botanical nomenclature is expected to further enhance the usefulness of the work to all those desirous of knowing the potentialities and resources and life and habits of this rich area-Ladakh-which is also referred to as "*Land of Gumpas* and *Lamas*."

The Council is grateful to Pandit Shiv Sharma and Prof. Namjoshi for their keen interest and continued guidance in bringing out this revised edition and also thanks all the officers and agencies that have been responsible in this task.

NEW DELHI,
19th, APRIL 1978.

P.N.V. KURUP
DIRECTOR

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Prologue

The Central Council for Research in Indian Medicine and Homoeopathy conducted a three-month pilot techno-socio-economic survey of Ladakh area often reffered to as 'Dust Bowl of Earth' or a 'Land of Ruins'. The team during its pilot survey collected details relating to social life, customs. food habits, disease incidence, traditional medical knowledge, medical systems, medical practices, medico-botanical wealth, mineral deposits, fauna of the area, with an accent on the scope for minimising importing of raw drug material involving foreign exchange. Ladakh is the northern-most district of Jammu and kashmir State. It lies between north latitude 32° 15' to 36° 0' and east longtitude 75° 15' and 80° 15' with an area of about 1,00,000 Sq. Kms, Despite its enormous size it is among the least populated areas in the Country. Its population of 1.05 lacs constitutes 27% of the total population of 46.15 lacs in Jammu and Kashmir. Its boundary is extremely irregular in outline. It is just like a triangle the base of which forms the southern limit running obliquely for about 353 Kms. from south east to north west. It is bounded in the north, north-east with Tibet (China) north west with Baltistan (Pakistan) and in the west with Himachal Pradesh. The 4 parallel ranges of mountains, i. e., (1) Karakorum range (2) Kailas ranges (3) Ladakh range and (4) Zaskar range stretch through the districts from southeast to north-west. Ladakh, though a country with mountains yet has a number of passes in this region. These passes are called *La*. The important passes are (1) Zozi La (2) Namika La (3) Fotu La (4) Khardung La and (5) Tanalang La. The Ladakh may be divided into physiographical regions, administrative regions or forest regions based on type or purpose of study/activity.

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Physiographically the area may be divided as Rubshu, Zanskar, Nubra and middle Ladakh. The administrative region comprises of Leh Tehsil, Neuma Tehsil, Nubra Tehsil, Zaskar Tehsil and Kargil Tehsil. The forest range includes Leh-range, Chumathan-range (Changtham range), Nubra-range, Zaskar-range, Kargil-range and Dras-range.

The earliest description of Ladakh territory was provided by the Chinese pilgrim, Fahian (399-400 AD). Subsequently in the 7th century AD, Husan Th Sang, who visited referred to this areas as "Kingdom of *Molopho*" or "*San-pho-Ha*", meaning Indus. The present name of Ladakh is derived from the Tibetan name *La-Drag*". Before 10th century, the territory of Ladakh was under Tibet and the empire of Tibet was broken into petty principalities. The history of Ladakh upto 16th Ceutury is not known. In 1580 AD Chavang Namgyal, a descendent of ancient king of Tibet established himself in Ladakh. After Chavang Namgyal, his brother Jamya Namgyal became the king. After Jamya, in 1610 AD Singga Namgyal ruled Ladakh. He patronised religious activities in his kingdom and invited Stksang-rasa-pa, a Lama far propagation of Buddhism in Ladakh. It was during the reign of Shah Jahan, the Moghals defeated the Ladakhis. In 1687 AD Ladakh became a part of the Mughal empire in India. In 1834 Maharaja Gulab Singh of Jammu sent a big army under Gen. Jorwar Singh to attack Ladakh and after that it became the part of Jammu and Kashmir.

The team which visited this historic area indicated the potentialities that can be advantageously tapped with considerable benefits to the country and the nation. The team also visited a number of Gumpas which housed manuscripts dealing with subjects like principles of religion, culture, Buddhism, medicine etc. The report has dealt with subjects like disease incidence, dietitic habits, medical literature, folk medical claims, besides information on medico-botanical wealth, mine-

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ral deposits and petro-mineral reserves, and fauna of the area. The medical system that is prevalent in the area goes by the name *Amchi* system. The *Amchies* have not only theoretical texts but also practical experience handed over from generation The *Amchi* system which is very popular in Ladakh comprises of treatment by herbs, minerals, drugs of animal origin, spring and mineral waters, moxibustion by herbs and metals, vein puncturing, and by mysterious and spiritual powers. In areas like Dras, Kargil, Sankhoo village up to Mulabeck, Unani system of medicine is practised due to Muslim inhabitation and the native doctors are known as Hakeems.

The team surveyed Drass, Kargil, Leh, Chumanthan and Nubra ranges and colleted 1025 plants species. The important medicinal plants of these various regions are also enumerated. Certain areas of Ladakh seem to be rich in vegetable drugs like *Gentaina kurroa*, *Ephedra gerardiana* Wall, *Orchis latifolia* Linn., *Hyoscyamus niger* Linn., *Physochlaina praelata* Miers., *Macrotomia benthami* (Wall ex. G. Don) D.C., *Rheum* Sp., *Aconitum heterophyllum* Wall., *Podophyllum hexandrum* Royle, *Impatiens* sp., *Lotus corniculatus* Linn., etc. that can greatly enhance the drug trade. The team reported the presence of belts of *Shilajit*, borax, sulphur, sodium sulphate, antimony sulphate, sodium bicarbonate, and yellow arsenic. Another drug of vital importance commonly used in Indian medicine, *Jahar mohara* is also available in some of the valleys. The rich mineral and petromineral belts need effective tapping and they be suitably processed and advantageously used in medical practice. Just as there is typical flora in the area there is typical fauna. Musk is an important drug of animal origin finding a key place in medical armamentarium of physicians of Indian systems of medicine. It may be obtained from the musk deer from this area since the animal is a normal habitat at this snow-belt level. Since the animal is on the verge of extinction it is possible, only if adequate steps are taken for breeding and propagating the musk deer by starting a well maintained musk deer

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farm. Proper exploration of the area has scope to make available source material for ephedrine, atropine, cumin seeds, asafoetida and a large number of plants mentioned earlier.

The team braved the rough weathers of high altitude and the risk iuvolved in the distant high mountains and did excellent work that deserves appreciation.

The Council gratefully acknowledges the assistance rendered by governmental, military and other agencies connected with/ stationed at Ladakh area.

The present work is a succinct picturisation of this less exploited rich area which is capable of yielding plants, mineral, petro-mineral material and also a rich medical heritage preserved in its pristine form. It is considered that this publication covering details ranging from anthropology to zoology including flora and medicine can well form a window of this rich area, Laddakh, referred to as '*Land of Gumpas and Lamas*'.

P.N.V. Kurup
DIRECTOR

25th March 1976

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Geographical Position
Meteorological Information

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A PILOT techno-economical survey of Ladakh was undertaken by the Central Council for Research in Indian Medicine and Homoeopathy with a view to collect details related to herbal wealth, medicinally useful mineral resources, medical systems, folk medical literature, disease prevalence and incidence, dietetic habits and social customs that influence the health and living of the people.

The findings reported in these pages may help in assessing the quantitative availability of the herbo-mineral wealth as well as in identifying new resources for the drugs which are being imported to the tune of several lacs from the foreign countries. The planned collection, cultivation and processing of the crude drugs, growing in abundance will not only save the foreign exchange, but also provide economic incentive and employment to the people of the land.

The information collected on the traditional medical knowledge of Ladakh may be taken-up for planned studies/trials to evaluate their place in the context of the contemporary systems of medicine and current developments. The plants, mineral drugs and formulations, so collected from the region will be tested chemically, pharmacologically and clinically. It may be that a new herb or a formulation may be discovered for the incurable diseases which no doubt, be a signal contribution to the medical field.

Ladakh, often referred as the "Land of Ruins" or the "Dust Bowl of Earth" fascinated the minds of men from times immemorial and is indeed the Shangrila of the past. It is shedding the vestiges of medieval backwardness, with the help of various Government agencies, that are helping the region to make an advance towards a new destiny.

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Geographical Position :

Ladakh is the northern most district of Jammu and Kashmir State. It lies between north latitude 32° 15' to 36° 0' and east longitude 75° 15' and 80° 15' with an area of about 1,00,00 Sq. Kms. Despite its enormous size it is among the least populated areas in the Country. Its population is 1.05 lacs constituting 27% of the total population of Jammu and Kashmir.

Its boundary is extremely irregular in outline and in shape. It is just like a triangle, the base of which forms the southern limit running obliquely for about 353 Kms. from south east to north west. It is bounded in the north, north-east with Tibet (China) north west with Baltistan (Pakistan) and in the west which Himachal Pradesh.

Mountains :

There are 4 parallel ranges of mountains Karakorum range, Kailas range, Ladakh range and Zaskar range which stretch through the districts from south-east to north-west. The general direction of the mountain chains determine the course of the river as well as the boundaries of the natural division of the country.

Karakorum range :

This range extends for about 480 Kms. from the Afghanistan border south-east to the main bend of the Shyok range. It is the most heavily glacialated region outside sub-polar latitudes bearing some of the highest peaks like K2 and longest glaciers in the world. This range divides Ladakh on the north with the Chinese districts of Kotan.

Kailash range :

It is the south-west Trans Himalayan mountain range extending 576 Kms. East-South of Indus river with an average width 32 Kms. The highest peak of the range is Kailas in Tibet.

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Ladakh range :

It is the trans Shyok lateral range of the Korakorum mountain extending 368 Kms. south-east from Shyok river mouth, stretching mostly across Tibet and goes outside the Ladakh in both the directions. It runs parallel with the right bank of Indus.

Zaskar range :

It is the north lateral range of the Himalayas, in Kashmir, Tibet and Kumaon. It extends for 640 Kms. south-east of river Suru to the upper Karnail river. The highest peak of this range is Kamet lying in Kumaon,

The main rivers of the district are Indus, Shyok, Nubra, Zaskar, Dras and Suru. The Principal part of the country is that which follows the course of Indus from south-east to north-west through the great part of the country. The principal tributaries of Indus are Shyok on the north and Zaskar on the south. The principal tributaries of Shyok are Nubra, Change, Chemo, and Lungchu, and of Zaskar, Sumgal, Tsarap and Serchu.

The contribution of rainfall for water is insignificant; the discharge of river Indus and its tributaries depend on snow melt in the upper catchment area.

The territory of Ladakh is one of the most elevated regions of the earth. Its main valley lies along the water heads of Indus, Shyok, Nubra, Zaskar, Dras and Suru. The Joint effect of elevation and of isolation amidst snowy mountain produce perhaps the most singular climate in the known world. Scorching heat of the day is followed by biting cold at night; and every thing is parched due to extreme dryness of the air. Much of the area is the drainage of the Indus river with an annual rainfall which rarely exceeds 7.5 cm.

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It is the aridity more than the height that reduced Ladakh to the desolution by which it has become, a vast "Dust Bowl" and very fertile wherever water can be brought to irrigate the soil.

Ladakh is a montaneous country and there are a number of passes in this region. These passes are to be crossed for reaching from one place to other. During winter season, when these passes are covered with heavy snow blanket, the communication from one part of the region to the other is cut off. The passes are called *La* in Ladakh—Ladakhi.

Some of the important passes crossed by the team are as below :

1. Zozi La —3510 meters—Srinagar to Dras
2. Namika La —3900 meters—Kargil to Boodhkharboo
3. Fotu La —4000 meters—Boodhkharboo to Khalsi
4. Khardung La—5500 meters—Leh to Nubra
5. Tanglang La —5250 meters—Upshi to Tsokar

Ladakh may be divided into different regions from the Physiographic point, administrative angle and from the presence of forest ranges as hereunder.

a) **The Physiographic region :**

i) Rubshu

ii) Zanskar

iii) Nubra

iv) Middle Ladakh

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b) **The Administrative region :**

i) Leh Tehsil
ii) Neuma Tehsil
iii) Nubra Tehsil
iv) Zaskar Tehsil
v) Kargil Tehsil

c) **The Forest range :**

i) Leh range
ii) Chumathan range
iii) Nubra range
iv) Zaskar range
v) Kargil range
vi) Dras range

The climate of Ladakh is extremely dry and cold. In winter, the rivers freeze and from natural roads to pass from one part to another. Thus in winter, the Nubra and Zanskar rivers open up communication between Nubra and Chorabay and Middle Ladakh and Zanskar respectively.

Generally the temperature at Leh during summer goes up to 26°C during day and scales down to 18°C during winter at Night.

The minimum temperature during winter at night at different localities are as under:

Dras	—	60° C
Kargil	—	15° C
Nyoma (Changthang)	—	35° C
Diskit (Nubra)	—	45° C

Ladakh is practically without rainfall. The average rainfall at Leh is about 0.6 inches a year.

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The climate of Ladakh presents great extremes of temperature mixed with dryness. The monthly average, maximum and minimum temperature, dry, wet, humidity, snowfall and rainfall of Leh, are as follows:

Month		Max.	Min.	Dry	Wet	Humidity	Snowfall Total	Rain Fall Total
April	1974	14.6°C	1.3°C	—	—	—	—	—
May	'74	16.7°C	4.7°C	—	—	51.5%	—	—
June	'74	20.5°C	7.8°C	—	—	59.3%	—	—
July	'74	26.0°C	12.5°C	—	—	60.6%	—	—
August	'74	25.5°C	12.7°C	—	—	46.0%	—	—
Sept.	'74	20.9°C	6.7°C	—	—	46.2%	—	—
October	'74	15.5°C	—0.3°C	—	—	64.7%	—	—
Novem.	'74	—5.0°C	—5.8°C	—2.6°C	—0.7°C	—	—	—
Decm.	'74	—3.3°C	15.1°C	12.5°C	—2.7°C	—	—	—
January	'75	—6.9°C	17.4°C	15.5°C	12.9°C	—	—	—
February	'75	—4.0°C	18.2°C	15.5°C	11.9°C	—	—	—
March	'75	—0.3°C	—6.8°C	—6.6°C	—3.5°C	—	—	—
							22.17 Inchs	0.54 Inchs

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LADAKH

Map Showing Areas Explored and Route Followed

INDEX

Areas explored
Route followed →
Places visited
Minerals
River
LA

Lazenda

1. Jammu	2. Udhampur
3. Batot	4. Anantnag
5. Srinagar	6. Sonamarg
7. Zozila	8. Meenag
9. Matida	10. Sonikund
11. Mulibekh	12. Lamayaru
13. Nimmu	14. Leh
15. Bhardung village	16. Kisit
17. Hunder	18. Terso
19. Summar	20. Tecer
21. Namik	22. Cdey
23. Henis	24. Upshi
25. Chushml	26. Kiyari
27. Nee	28. Skltnanc
29. Chinatng	30. Moha
31. Tencnon	32. Suta
33. Kyeiang	34. Kulu

Rivers

R. 1. Indus	R. 2. Shoy
R. 3. 3 & 10	R. 4. Nubra
R. 5. Ndraub	R. 6. Karkoram
R. 7. Suru	R. 8. Zanskar
R. 9. Chenab	

Lakes

L. 1. Chang	L. 2. Taglang
L. 3. Khardong	L. 4. Fatu
L. 5. Namkh	

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Historical Account

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The earliest description of Ladakh territory was provided by Chinese pilgrim Fehian, who visited it in 399-400 A. D. and described it as Kie-Chha. According to him, the country had a king and numerous clergy, and Buddhism was prevailing. Huan Th Sang, who visisted India in the middle of 7th Century A.D. described it as the "Kingdom of Molopho" or "San-Pho-Ha", meaning Indus. The present name of Ladakh is derived from the Tibetan name" La-Dwag".

Before 10th Century, the territory of Ladakh was under Tibet and when the empire of Tibet was broken into petty principalities, Ladakh was by palgyi-Gon. The history of Ladakh up to 16th Century is not known. In 1580 AD, Chavang Namgyal, a descedent of ancient King of Tibet established himself in Ladakh. After Chavang Namgyal, his brother Jamya Namgyal became the King. After Jamya, in 1610 AD Singga Namgyal ruled Ladakh. He patronised religious activities in his kingdom and invited Stk-sang-rasa-pa, a lama for propagation of Buddhism in Ladakh.

It was during the reign of Shah Jehan the Moghuls defeated the Ladakhis. In 1687 AD Ladakh became a part of the Mughal empire in India.

In 1834, Maharaja Gulab Singh of Jammu sent a big army under Gen. Jorawar Singh to attack Ladakh and after that it became part of Jammu and Kashmir.

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Life and Habits of Ladakhis

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People :

The inhabitants of Ladakh are mongoloid in race. Their cheek bones are high with the face tapering rapidly downwards. The chin is small and retreating. The eyes brown in colour, are drawn out of the outer corners and the upper eye lids are overhung by a conspicuous fold of the skin above. The nose is pressed, so to say, into the face and it is often depressed at the bridge. The mouth is large and inexpressive. the lips project but are not thick. In stature, the Ladakhis are short; the men measure about 5 ft. 2 inches and the women 4 ft. 10 inches. Both sexes are broad-made and strong. Ladakhis are a cheerful and good tempered people, always ready smiling.

Language :

The people inhabiting Ladakh speak Tibetan dialects. In Dras, Kargil the Dard dialect prevails. In Tibetan dialect the following are the languages :

a) Language of Baltistan known as Balti

b) Language of Champos

c) Language of Ladakh, known as Ladakhi

Dress :

The dresses of Ladakhis are simple in appearance and is all woollen; there is very little difference between the garb of a man and a woman, as they both wear the effeminate long coats or *Choga*, tied with broad firgles, which in woman it is sleeveless. In town, like Leh these are sold ready made

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but in remote villages the chogas are home spun and home made. Men and women usually wear woolen caps, which are peculier and in places, like Boodh-Kharboo, Rupshu etc., the caps are with two ear flaps. To the Ladakhis, the boots are a matter of great importance. The stony ground and the biting snow of the winter call for a well protective shoe. A piece of thick leather makes the sole and is moulded round for the sides of the feet as well. The leg is further protected by felt gaiters, secured by a tape wound many times round.

Houses :

Houses in Ladakh are mostly on hilly cliffs and are made of stone masonary plastered with mud, as cement is not available. Rafters, doors. and windows are made from woods, which are usually obtained from locally grown populus trees or brought from Sonamarg. The coilings are covered, with locally available woody branches of *Salix/Populus/Rhododendron* etc., and later plastered with mud. The roof is usually made flat. This is made so because there is no rainfall in this region. Rooms are small with artistical decorative small ventilators or windows for the exit of the smoke. The fuel is stored over the roof for the winters. In verandah, the small pieces of wild and cultivated vegetables strewn in strings are a common sight; they are dried and stored for the winters. At one corner of the house one can see the dry cow dung cakes that are used as fuel.

Food and Beverages:

The majority of the people are non-vegetarian The main food of the people is *sathu* or '*Phe*' which is a powder of roasted wheat or barley, *skew, thukpa, mokmog, gyatuk, zan* etc., are their main dishes.

The main beverages of Ladakhi are tea (*Cha*), and '*Chhang*' (a type of local beer). The preparation of tea in Ladakh 'is very

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peculiar. In earlier times, the tea leaves were obtained from China through Tibet but now it comes from Srinagar The tea is first brewed thorougly in a water to which some soda is added. It is then mixed with some salt and butter and then it is churned.

Chhang is a sort of crude beer having a taste of cider. It is prepared from '*Grim*' a kind of barley which is boiled until it softened and then it is dried. Then, about 5kg. of softened grain are kept in a bag, mixed with a locally made fermentor, which comes from Nubra valley and kept in a warm dark, place until it ferments. It usually takes 2/3 days for fermentation. Equal measure of the prepared barley and cold water are put together in an earthen vessel and after allowing to stand for two days the fluid is strained off; a similar quantity is again added and treated in the same manner and the beverage called '*Chhang*' is prepared. The grains remaining after infusion are dried and ground to flour.

Preparation of 'Chhang' Tablets :

Information and process was collected from Shri Morphil, Skampok village, Diskit, Nubra.

For the preparation '*Chhang*' tablet, wheat is first taken and half roasted and flour is made. It should not be of coarse particles.

Jadwar (*Delphenium denodatum*) root 5-6 pieces, 1 tola of '*Jakrook*' and 2 tablets of previously made *channg* tablets should be taken in proportion of 1 kg. '*Atta*'. These are made into powder form and mixed with the wheat roasted '*Atta*'. Water is properly added to make into a paste. Small globuler masses are made of that paste and are coated with wheat '*Atta*'

Burhe (*Artemisia* sp.) is spread on the ground and tablets are kept on it which are covered with '*Burche*'. This is again

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covered with woollen warm cloth and left for 3 days. The entire fermentation process is allowed to be carried out in dark room. The warm cloth is removed and the tablets are left as such to dry for 3/4 days further. The tablets are then ready for preparation of *Chhang*, the popular drink of Ladaki people.

Cereals :

One crop in a year is commonly obtained from the fields except Kargil region from where two crops a year are obtained. The major cereals that are grown are barley (*Nas*) and wheat (*Gundum*). At higher altitudes, a special variety known as '*Grim*' or Tibetan barley, is grown. It is an important stable food of the entire region.

The other important cereals are buckwheat *(Bro)* or *Trumba*, millet (*Cheecha*) and amaranthus (*Gunhar*).

Vegetables :

In earlier times only a few vegetables like *Lathyrus* (Wild-pea) Potato, Radish, Onion, Garlic etc. were grown. Vegetables like cabbage, turnip, spinach, brassica etc., were introduced now.

Fruits :

In the warmer valleys like Kargil, Sankhoo, Khalsi, Nubra etc., fruits like apricots, apples, *chili* (variety of Appricot). walnut etc., are cultivated.

Crop wise distribution in the total net area is as below :

1.	Barley, gram and other millets	2429 Acres
2.	Wheat	8024 Acres

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3. Fruits and vegetables .... 965 Acres

4. Other fodder crops ... 6096 Acres

Ornamentals :

Ladakh being very arid, people do not seem to be in the habit of cultivating ornamental flowers. Only, in Dras. people were seen putting in their *Chogas's* collar big pink flowers, which locally thrives. *Rosa webbiana* Wall. ex Royle, and *Rosa eclanteris* Linn. are tucked in the collar. The names of some wild fiowers collected from high up mountains indicate the aesthetic taste of the people of Ladakh.

Campanula sp. (3429) is known as '*Dango Ma*' meaning a beautiful flower growing upto the snowline. *Stellaria* sp. (3432) ,*Doodhi Chal*' meaning as the flowering that comes out first when the snowmelts.

Gerenium sp. (3433) '*Gulab Pusho Phulo Bibiji*', meaning 'O Darling, the flower of rose is to bloom'. *Galium* sp. (3434) '*Saroni Pusho Dadiji*' meaning 'O Granny, should I bring the Flower for you'. It is said that on the flower *Compositae* (3435) '*Kulina kuklina Chi Bhande*', there is a story it is said it is very much loved by a particular type of insect, and one day, the insect was moving about in search of this plants but could not find it. It met another insect which who asked whether he found the Plant. The first insect replied '*Kuklina Kuklina Chi Bhendo*' meaning 'yes certainly, I got the plant, but it was too bitter so I left it.'

Fuel and Foddar :

Fuel is the biggest problem for the Ladakhis. They have to go miles away from their villages, sometimes even 15—20 Kms. The high altitude shrubby plants like. *Bebreris* sp. *(Kirsing)*, *Rhododendron anthopogon* D. Don. *(Tali)*, *Juniperus* sp.,

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(*Shukla*), *Myricaria* sp. (*Umboo*), *Cotoneaster* sp; *Ephedra gerardiana* Wall. (*Chaput*); *Acanthaceae (Lomje); Caracana pyomea* DC. *(Bruma); Artemisia* sp. *(Burche etc.*, are collected.

Foddar plants differ from region to region. The main are *Prangos pabularia* (*Prungus*;) *Ferula jaeschkeana* Vetke, (*Hooting Praungus*), *Haracleum* sp. *Asphodelus* sp. and many varieties of grasses etc.

Medicago sp. and *Trigonella* sp. (*Sphit Jaroi sphit*) and *Salix sp.* (*Machyan*), *Iris* sp. and other plants are also used as foddar. The poisonous properties of *Hyoscyamus niger* Linn.; and *Physochlaina praleata* Miers. are known to them.

Domestic animals :

People of Ladakh keep a number of domestic animals, i.e., yak, zebu, goats, sheep, cows, donkeys, dogs, cats, and hens and cocks (in muslim inhabited places). Yak (*Bos crumniens*) is low and powerful with large, sweeping horns and long fur usually dark brown or black. The milk and butter are used as food. Yak's tail is sold commercially as a whisk to keep flies off. Yak can carry huge loads of weights—100—150 Kgs. It can go practically anywhere, as high as man can go. Zebu is a type of sterile yak.

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Religio-Social Customs and Beliefs

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Child birth (Penak)

Ladakhis have their own social customs like Tibetans, right from child birth upto death.

When a child is born, it is washed with hot water and given a massage with the *loi* (cake of *Atta*) and oil, After two days of birth the umbilical cord is cut. No one is allowed to enter the maternity room. The mother is given milk as food as well as '*Thukpa*', 'Murjin (*Sattu*' with butter). After a week, a small puja is done, and after 15 days '*Chonga*' is celebrated by calling guests who are offered *Chhang*. They usually bring presents of clothes, money etc. After one month birth day is celebrated which is known as *Daunag* (*Dun*). The mother is offered presents like bedding cloths, money etc., brought by the guests.

Every year, '*Daunag*' day '*Skechak*' which is a birth anniversary is celebrated. In this function, the old cloths are given to the mother and the child. The hair of the child is cut and the function is known as '*Kalu Phaph*'

When the child attains the age of 5 or 6 years, he is sent to school with his brother or a junior relative with some eatable for the teacher. This school going function is known as *Lepta Kherat*'.

Marriage Ceremony :

When a person attains the age of 20 to 25 years, negotiations for his marriage starts. When a suitable girl is chosen

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relatives of the bridegroom go to the bride's house with some money and vesselful of '*Chhang*' and a white sacred cloth known as '*Khatak*'. This ceremony is known as *Pagmatichis*. After presenting the *Khatak* (A white finely netted cloth piece used in worshiping and in ceremonies.) and the money *Chhang* is drunk by both the parties. If the marriage as settled, the bridegroom's relatives again visit bride's house after 2 or 3 weeks, with vessels containing of *Chhang* and some ornaments like neklace (*Namchokali*) and bangles (*Pema lepche*) of gold. If the person can not afford to present gold bangles, about Rs. 500/- are given in lieu of gold bangles.

Another visit also takes place when the maternal uncle of the bridegroom is present for the talk and the date for the marriage is fixed. This ceremony is known as '*Chakea otachis*'.

In marriage, about 10/12 persons go from bridegroom's house at night. New dresses for the bride are taken. The maternal uncle of the bridegroom is the main representative of the bride-groom. The interesting point of marriage is that the bridegroom does not at all go to perform the marriage but sends his representative. The representative usually keeps white cloth on shoulders which is tied on *Salix* wood on which *Om Ma Ni Pad Ma Hoon* is written and can be distinguished easily. He distributes sweets and money to party members. When the party reaches bride's house, a curtain is spread in between the two parties—this is known as '*Lagor*'. There is a special man, known as *Natipa*, who with *Chanting* of the mantras exchanges '*Khatak*' of both sides. The bride is brought to bridegroom's by the representative and is handed to bridegroom and they both sit together and eat in one plate and people offer *Khatak* to both of them.

After staying for a few days, at bride-groom's house, the birde and bridegroom along with some relatives, again go to the

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bride's home. This ceremony is known as '*Pakdun*' and after formal rites the marriage is confirmed and both become husband and wife.

The marriageable age for boy is 20 to 25 and for girls 18 to 20 years.

There are a number of instances/ cases recorded in which the female bears child even before marriage.

Death Ceremony:

There are four main ways of disposal of a dead body. They are known as *Masbok*, *Chinda-cha Khiyang*, *Chu* and *supchis*. (i) '*Masbok* (disposal by burning)' : When a death occurs, no body touches the dead body. A Lama is called who washes the dead body performs a puja for 3 days or for a week or more. Only rich persons can offer prayer for more than a week. Then the Lama declares a day, for the final funeral. On the funeral day, with the consent of the head of the house, 10, 25 or 30 Lamas are called. People visit the deceased house with a big plate of '*Sattu*' and big breads. The breads are given to 5 or 6 mourning family members.

Then the Lamas keep the corpse in a sitting posture with folded hands and funeral procession is taken out. Woods like *Shukpa* (*Juniperus) Skam Shah* (*Pinus* sp.) and a little of *Karmagh* (Sandal), 2 kilo of oil or butter, 1 kilo *gundum* (Wheat) 1 kilo peas, *Dehi*, *Rampa* (a type of grass) and scented sticks numbering 108, *Umbu* wood 108 are arranged and these are known as '*Ring Chak*'. In the cremation ground the dead body along-with '*Ring Chak*' is kept over the pyre and burnt.

While the corpse is burning, then 4 or 5 persons, who now known as '*Phaspun*' only stay and rest of the funeral party members return. The '*Phaspun*' stay upto the time the corpse

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is complately burnt and then they fumigate their body with smoke as a mark of washing.

On the 4th day, known as *Richiks*'- early in the morning, the '*Phaspun*' go to the cremation ground. They clean the place and take the ash to a high hill from where it is blown away. The bones are collected, which are either thrown into the river or are grounded with barley or wheat and then mixed with clay to form a sort of biscuits, which are known as '*Chacha*'. Then, The lams after reciting few mantras places The '*Chacha*' inside the *Chorten*'.

The *Ompo* (the astrologer) is called, who by seeing the horoscope,finds out the last desire of the deceased. Suppose if he finds that the last wish of the deceased was to acquire money or child or women then money or the clothes of child or women are distributed to the poor. *Ompo* also tells about the next birth of the deceased, whether he will be born as a Lama or an animal and also the direction where he will be born.

Every week, a pooja is conducted which is known as '*Durchick*' . After one month Lamas are again called and *prasad* is distributed to Lamas and this ceremony is known as '*Ripchujargu*'. In this 2 breads are distributed to each of the persons who attend the deceased house for the ceremony.

(ii) *Chinpa, Cha Khivang,* (Disposement by Vultures and Crows)

In this form of disposal, the corpse is taken to a funeral hill, where its face is wrapped by a cloth and left for crows or vultures to eat and by doing this they get spiritually satisfied. It is common in areas were there is shortage of wood. Due to this the body is left in thus way. This type of disposement of body is confined to Myoma and interior areas.

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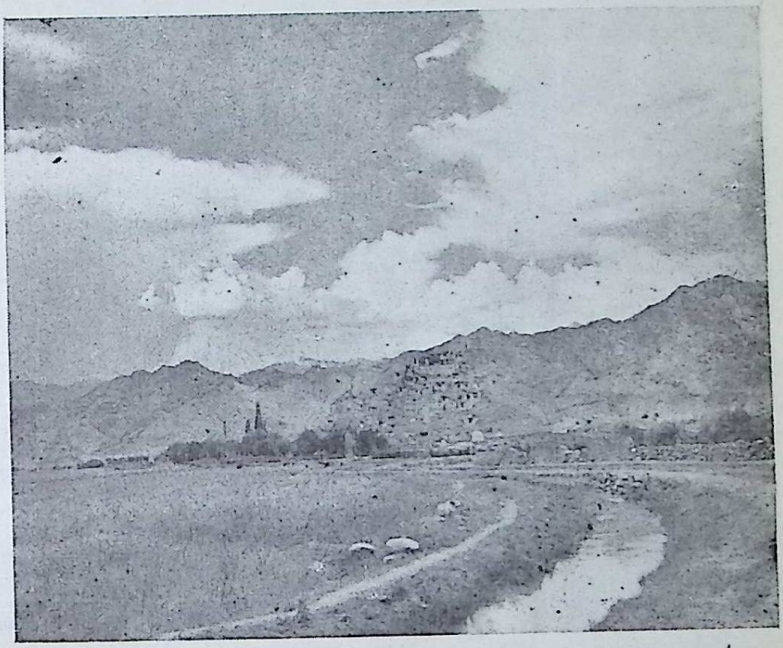

A View of "Shey" Gumpa near Leh

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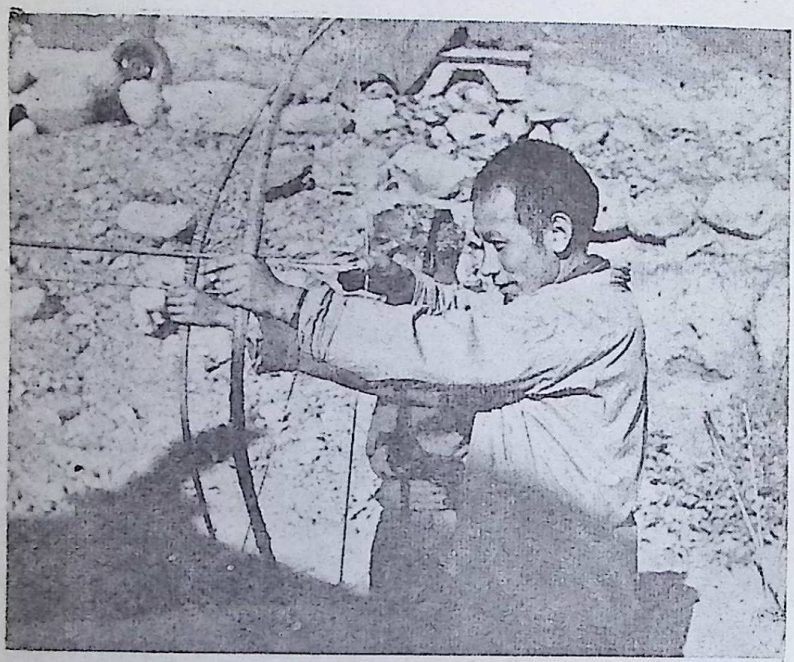

Arrow shot, a social game of Ladakh

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(iii) '*Chu*' (Disposement by Water)

The dead bodies are drowned in a river. The Child below 8 years, or a person died of high fever or small-pox are, however, not disposed in this manner.

(iv) '*Supchis*' (Disposement by Burying)

Burying of corpse is supposed to be the worst type of disposal. It is done only in special cases; ladakhis believe, that there are 36 *prans* in human being. One is he himself, and 35 are others; in burying the sin (*Papa*) of 35 other *Prans* are received. They also believe that there are millions of organisms in the body. So they avoid burying.

Festivals:

In Ladakh only one festival is celebrated and that is *Darchis*; the festival of archery.

In the month of May/ June, men and women assemble and they collect by subscription some money for arranging the show. People come to place of the show, in their best attire. The games starts with the beating of Drums. Then, a clay model is kept in the centre known as *Ben*. A ball's eye, is made in the *Ben* which is known as *Chanas*. People aim the target; the archer is presented with *Khatak* and then, the successul shooter will distribute some money to the drummers. This show goes upto evening and in the evening, men and women, dance and sing. and drink *Chhang* and relish meat. This festival goes on for three days.

Polyandry:

Polyandry is a form of polygamy. But in this instead of the husband having several wives, the wife has several husbands

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Though it is out lawed by the Government, still it is being practised in Ladakh and many cases of polyandry were recorded.

The institution of polyandry is confined to the brothers in a family, the oldest marrying a wife whose other husbands are also his brothers.

It is said, that polyandry was introduced into Ladakh and Tibet to take care of the special need of family life there. The man of the house customarily spends more than half the year away from home with caravans, or with sheep and goats, or on pilgrimage. There is the need to protect the woman and the children during this long absence and to maintain a standard of connubial fidelity. So the wife is given protection and companionship of extra husbands.

In some regions, polyandry may have been designed to cut down the number of babies. Haine Mann in his book Sexual responsibility In Marriage' States, 'at this moment in Ladakh, a cold Himalayan waste land, which will support only a small population, the birth rate is controlled and children are nourished under a system of polyandry which permits a women to have 3/5 husbands'. The scarcity of food is throught by some to have been reason for the introduction of the polyandric marriage long ago.

Another theory behind polyandry traces to a purpose that serves the interest of the monastories. The idea is that if a woman has several husbands there will likely be discontent and rivalry among the men. The wife will have favourites and there will be some husbands who will not share fully in the connubial bliss. They are apt to turn their backs on marriage and retire to the monasteries to become Lamas.

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Religion:

It is said that Buddhism in Ladakh came during Ashoka period. King Ashoka deputed monks to Turkistan, Tibet and China through a missionary known as-Madhyaantika. According to Ladakh chronicles the holyman came with sacred books and spread the message of Buddha beyond Indus: In Ladakh, the Buddhist preachers or Lamas belong to two major orders *Dye-Idan-Pa* (Yellow Section) and *S-Skya-pa* (Red Section). There are about 15, 000 Lamas and 500 *Chomos* or (Nunries). Whole Ladakh is dotted with Chortens, Mani walls and Gumpas,

Chortens (Manik)

Chortens are pyramidal structures. 10 to 30 ft. high, made of stones and clay and usually white washed. The architecture of the Chorten is symbolic of the four basic elements. The lower cubical part is '*Sa*' or earth. Other the vessel of water '*Ghu*', spherical part is '*Me*' or fire and the upper part '*Hung*' or air or other. There are about 108 different designs of Chorten. They can be plain, Simple, *Mus* affairs, or they can be beautifully built out of hewn rock and adorned at the top with some metal. Sometimes, these are merely memorials in honour of persons of distinction, Generally ashes of deceased mixed with clay are placed in *Chortens*.

During Maharaja's period, the culprits used to be sent to remote places and were asked to construct *Manaks* as punishment. The large number of *Manaks* are the result of the punishment given to culprits.

These are usually constructed along the river, canal and said to be constructed to check floods and act like a bund. It is said that they usually guard the entrance of a village or a monastry. When the departed one is a wealthy persons, the

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urn containing wheat, barley, rice and peas, gems, silver, gold, copper, iron, knives, sword rolls prayers and holy writings, pieces of *Juniper* and Sandalwood etc., are kept inside the *Chorten.*

Mani Walls :

These are wall like structurers about 6 feet in width and 3 to 5 feet tall. They are 15 to 100 feet long or some time more in length. The top of these are strewn with small flat rock slabs on which mantras are engraved like, '*Om Mani Padma Hoom*' or (*Om Vajara Pai Hoom*) etc., One who passes a mani wall murmurs "*Om Mani Padma Hoom*"

These mani walls are erected during July-August. A society is formed in every village who selects a manager and all funds collected for its construction are handed over to him. Then the manager sends out a party for collecting stones and the rock slab. The stones are used in forming the well and the slabs are chiselled out to get a particular form and them engraved with the mantras. Each year about 10' long wall is erected. Nowadays only a few *Chortens* are erected.

Gumpas or Monasteries :

Gumpas are the monasteries where Lamas reside and worship. There are about 16 main monasteries besides several smaller ones in Ladakh. The important monasteries are Sarkar, Shay, Hemis, Nyuma, Spittuk. Tikkaany, Phiang, Stakna, Likir, Alchi, Lamayuru and in Numbra Yarma, Hinse, Samtaling, Diskit Gumpas etc.

The party visited the following main monasteries :

1. Hemis
2. Likir

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3. Nane-Sumjan
4. Sanstaling

Hemis Gumpa :

Hamis is situated at a distances of about 45Kms. from Leh-Chumathan road which leads to Tibet. From Marchelog, which in 35 Kms. from Leh. to the South, there is a small canyon or nallah and one has to cross river Indus to enter into it. The Canyon leads to Hemis village which is situated in an open glen at a distance of 8 Kms. from the main road.

The building of Hamis monastry is a crude three storeyed building with low doors, stone walls, wood rafters, mud roofs and floors. This monastry belongs to Lamas of Red Section who are allowed to marry.

At the entrance to the main Chapal of the Hemis monastry there is painted on the right hand wall, the wheel of life. It is a spoked disc painted on a scroll. On the hub are painted a cock, a pig, and a snake, standing for lust, green and anger, the three vices, which torment human beings. The rim is divided into 12 segments representing such metaphysical concepts as 'Sense surfaces and understanding indulgence', and fuller life. The area between the hub and rim is divided into six compartments, sharply divided by the spokes. At the top is heaven, at the bottom hell. The other four spaces are devoted to human life, animal life, purgatory (Tormented) spiriit and titans. Closer inspection reveals a delorous prospec, a multitude of pictograph illustrating Buddha's doctrine that suffering is inevitable. All is transitory, painful and illusory. Life is an endless wearisome circle of rebirth. The pictograph further illustrates, human life, for instance, birth, old age, sickness, death, ungratified desires, struggle for existance, punishments, bereavements and offensive objects and sensations. Hell is also shown with hot and cold ones, with an additional outer guide.

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Each of these has especial tortures to suit various crimes and misdeamours.

The 'Wheel of Life' is held in the claws of a monaster who symbolises 'the Tendency of Clinging to Life and beyond the rim is shown Buddha who has escaped the road of metapsychosis. (Transmigration of soul).

There are also a number of 'Prayer wheels' called 'Mani' in the main entrance, set in left hand wall along rough rock step. These are about 1' to 1-1/2" and engraved with prayers *(Om Mani Padma Hoom)*. One spins them clock wise as he goes up or down the stairs.

There are a number of rooms in the monastry. A big praying hall about 60' x 60' is the main praying hall and the library. The walls of the rooms are painted with the events occured in Buddha life. In the Centre of the room there is a big Buddha statue about 10' high in sitting posture. On the back of the statue is a stupa studded with stones of various colours red, yellow, green and blue of the size ranging from a playing marble to a tennis ball. All is gold plated. Around Buddha are images of lesser deities and of incarnate Lamas. There is one of *Stik-Sang-Rasa-pa*, founder priest of Hemis. There is one of *Mila Repa*, the famous Tibetan poet who is loved in all Ladakh. There are number of large urns of about 4-5' in height. They are filled each year with yak butter by the devotees, and supposed to burn in an year and if the flame goes off it is regarded as a bad luck.

On the side there are pigeon holes in which the sacred manuscripts and scriptures of Buddhas preachings are lodged. These are, Kanjur of 108 volumes which is divided into parts as below:

1. *'Pulva'* *(Vinya)*
2. *'Sherchia'* *(Prajana-Paramita)*

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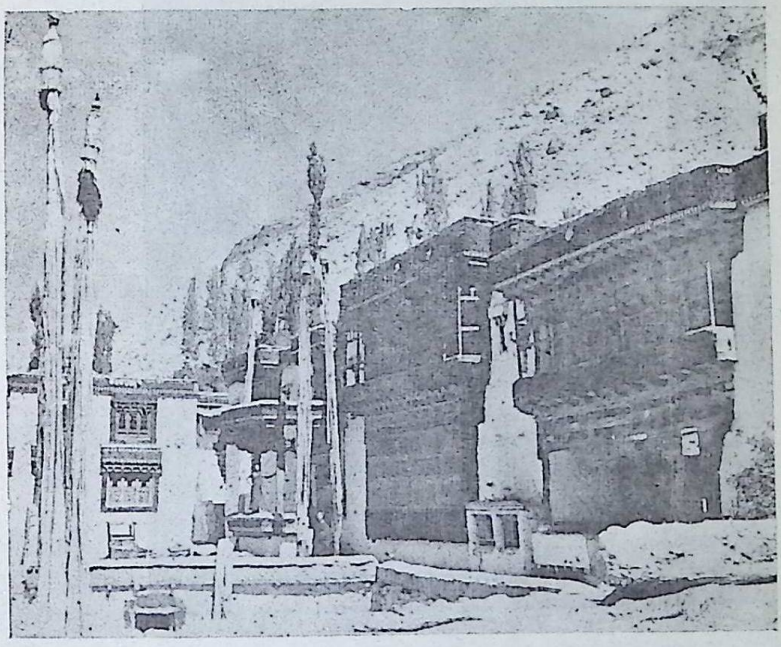

A view of Samtanling Gumpa. Nubra valley

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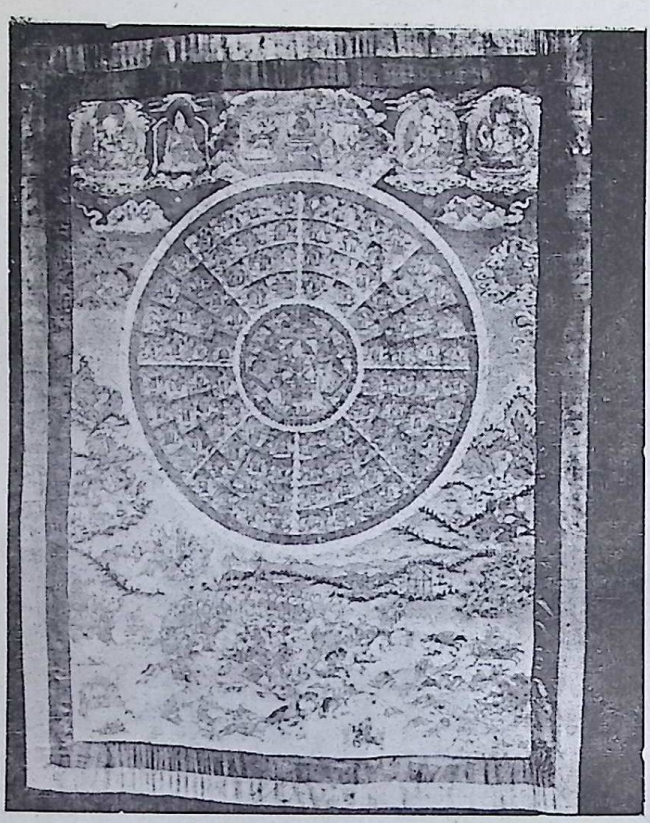

Sacred Mantras written and printed on cloth placed in a Gumpa

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3. '*Phalchhen*' (*Budha vata Maska*)
4. '*Konstek*' (*Retna-kuta*)
5. '*Kontok*' (*Sutra*)
6. '*Nyavdas*' (*Nirvana*)
7. '*Gyut*' (*Tantra*)

The other is Tenjoor with 225 volumes with two main parts i.e., *Tantra* and *Sutra*. Tenjoor are actually the eommentaries of Kanjoor by different Buddhist scholars and preachers.

In the monastry, prayer is done three time a day i.e., in the morning, afternoon and evening. The Lamas who assemble for the prayers get their food from the monastry. Hemis is the biggest and the richest monastry of Ladakh erected in 1602 AD by the King Sennge Namgyal.

Likir Gumpa :

Likir village is about 51 Kms. from Leh. The monastry is established on a hillock about 3 Kms. away from the main road and is a 4 storyed building, Outside, the main monastry there is a big '*Dellan*' court yard and side walls are painted with the life size sequence of Buddha, the prominent life-wheel and other mythological antecedents, As usual, there are number of '*Prayer wheel Manes*'. On the gate of the main entrance are painted code of laws for Bhikshus depiciting dos' and dont's. There are number of idols of deities like *Setapa*, *Jambiyan*, *Manu-Sri* and *Manju Ghosh*. There is one idol of *Panch Stan be* (The God of Rain). It is said, whenever, rain is required or to be stopped the idol is taken to the upper most storey and from there it is shown to the sky for bringing out the rain or for stopping it.

Another idol is of '*Rickshet*' It is told whenever, any heavy fighting goes on, in Ladakh and number of people die,

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then, the blood comes out from the mouth of '*Rickshet*' God of Likir Gumpa.

This monastry was built by king Lha-Chen-Rgyal in the 11th Century. The younger brother of Dalai Lama Sri Hari Singh Rimpoche supposed to be reincarnation of the head priest of this monastry.

There is a library room, where old manuscripts, are lodged in the glass almirahs. Among the important manuscripts, which are kept in the glass almirah is the "story of *Padma Sambhava* or *Guru Rimpoche*" and 2 sets of Kanjoor with 100 volumes.

There are about 130 Lamas in this monastery. And according to the Lamas, the monastery is 971 years old and all the idols etc., have been brought from Tibet.

Nane-Sumjan-Gumpa :

It is situated at about 10 Kms. away from Panamick (Fordable upto 4 Kms. the rest of 6 Kms. to be travelled on foot.) It is said that the body of the Lama is kept in a wooden box there. When a true religious minded man visits, the soul speaks and he can talk with the soul.

Sanstanling Gumpa :

It is on the road side enroute to Tiger from Panamick. A number of manuscripts are there. By a special request to the Head Lama, manuscripts could be seen. These are :

1. 102 manuscripts (*Kanjoor*) — On Principles of religions.

2. 52 manuscripts (*Sumboom*) — History of religion.

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3. 140 manuscripts —Buddhist culture and religion.

4. 125 manuscripts on *Kanjoor* are kept upstairs and could be seen on special request.

5. A few hand written manuscripts are also in the Gumpa on religion and are very secretly kept.

6. Manuscripts on medicine are also available specially dealing with Amchi system of medicine.

Incarnation :

Succession of incarnate Lamas is a complicated affair. It is done on the basis of the transmigration of soul. The Chief Lama usually forecasts before his death that he will take birth in particular village and that too in a particular family. If the Lama does not forecast before his death then a search is conducted of the newely born babies after a few weeks time from the death of a Lama. Personal belongings of the deceased Lama are placed before the baby with other similar articles. If the baby touches the belongings of the deceased Lama, he is considered to possess the departed soul. Such baby even on attaining the age of 3-4 years tells his past life-history. After a year or so the boy is brought up and educated under the guidence of the priest. Such a boy on attaining the age of I4-15 years used to be declared Chief Lama. There are five systems or characters for the Chief Lama and out of these at least three are necessary i.e., big ear ; big hands ; big fingers etc. Dalai Lama has got all the systems, hence regarded as the incarnation of Lord Buddha.

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Medical Practice in Ladakh

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Common Human Diseases and Medical Practice

A preliminary survey revealed that liver troubles *(Mechin-Pa)*, Stomach troubles (*Pho-Pa*) and Worm troubles (*Chun-nama*) are very common in this area. The local medical practitioner at Leh Hospital indicated that the stomach and liver troubles are due to the habit of untimely eating in excessive quantity, drinking of too much of tea with butter and *Changa* and due to drinking of water of the springs.

Rheumatism (*Tchi-Tchi Thong*) and lung troubles (*Globa*) are also frequently met with. Every 5th Ladakhi, above 40 years of age is afflicted with one of these. Cases of tuberculosis were also reported. Leprosy was only reported from Kargil Tehsil.

Medical Facilities :

Though there are a number of Government hospitals, Primary Health Centres and dispensaries in every big village of Ladakh, the local people prefer to get treatment from the local Amchies.

To encourage the *Amchi* system, the State Government nominated about 25 Amchies to whom it pays Rs. 100/- p.m. as honorarium and Rs. 500/- per annum for purchasing the drugs to each amchi. During discussion with the local amchies it was mentioned that the amount given to them is insufficient in view of the present high rates of the drugs and the cost of living. They are not satisfied with the amount receieved from the Government.

The *Amchi* system of Medicine has been in vogue in Ladakh for the past many centuries and throughout Ladak the

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amchies are looking after. the public health. The *amchies* have not only the theoritical texts but also practical experience handed over from generation to generation; they have also a reputation of having high ethical standard in social system of Ladak.

Unani & Talisman

In the muslim inhabited areas such as, in Dras, Kargil. Sankhoo village up to Mullback, the Unani system is practised by the native doctors, known/asHakims. The Hakims have considerable knowledge of herbs, and their herb collectors are shepherds. The local herbs that are used by them are *Thyma sp.*, *(Tumra)* Wild rose (*Duplling*), *Bergania* sp. (*Pahan*), *Artemisia* (*Burcho*) etc.

The people believe greatly in the efficacy of amulets given by Pirs. They cure all diseases. The amulet is either fastened to the right arm, neck or turbun or is put in the water and the water is taken inside. The amulets with writing in ink are also put in water and that water is drunk by the patient. At times, it is burnt and the smoke inhaled by the sick man. The inhalation brings dreams, and dreams must be told to the Pir, who will decide what is to be done further. The Principle in the treatment by the Pir fraternity is that illness is caused by evil sprits (*Jia)* and that an amulet will drive away the sprit.

Amchi System :

Beyond Mullback, which is a Buddhist inhabited area the people have their own system of medicine known as '*Amchi system*' or 'Tibetan system' of medicine.

History of Amchi System :

The *Amchi* system of medicine has been in Vogue in Ladakh district for the last many centuries. The system traces its

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origins to Ayurvedic system of India. It was brought to Tibet in the 7th century AD. It is studied and followed with great care and interest here.

Since the dawn of history man has been in search of ways to find cure and relief from mental and physical diseases. The ways were in the form of witch crafts, benediction etc. It is at that time Buddha delivered this original *Amchi* system of medicine, while the lord was meditating four years in the medicinal forest, some where near Budh Gaya. This was later in the reign of Tibetan King Sreng-Ki-Chan 750 AD., one renowned pandit named Barochana was sent to India and he translated into Tibetan script with the help of Acharya Chandra Deva. The text was then brought to Tibet.

This medical system had accumulated a huge literature in the course of time and *Amchis* of great fame and reputation were produced, whose contributions in this system is immense.

The survey party consulted many practising *Amchis*, notable among them are Urgyan Chospal of Nee village ; Nono of Kyari, Sonam Chhring of Leh, Lakshmi vongan, Bhangyastaos and Sonam Nmagyal of Chumathan, Chring Nagyal of Kitmiyang.

Amchies of the region have established an association under the chairmanship of Member Parliament Shri Kushuk Vakula, who is also a very famous Lama, an *Amchi* as well.

Therapy under *Amchi* system may be divided into the following modes of treatment :

1. Treatment by herbs.
2. Treatment by minerals
3. Treatment by the animal organs (Organo therepy)

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4. Treatment by Spring and mineral waters.

5. Treatment by moxibustion.

   a) By herbs.

   b) By metals.

6. Treatment by Vein Puncturing.

7. Treatment by mysticism and spiritual powers. (*Yantra Mantra*)

Treatment by Herbs :

The local doctors or '*Amchi*' use a number of herbs comprising of flowers, whole plants, roots etc.

Procurement : After August, when a number of plants are in flowering, the *Amchies* with their assistants make local trips to the nearby high mountains for collection of the herbs sufficient to last for an year. After collection, the herbs are dried, and stored in a cloth bag.

Administration : Mostly the '*Amchi*' keeps the herbs in powder form in small leather bags. At the time of administration the powder is taken out by a small spoon and a mixtue of the powder is made according to the requirements.

Within this system mainly powders, decoctions, and pills are commonly used.

The following are some important herbs commonly used by *Amchis* : (The names as given by the local amchi are noted)

1. *Changmoung*
2. *Pasaka*
3. *Dharam*
4. *Parpata*

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5. *Naram*	6. *Tikta*
7. *Garam*	8. *Palu*
9. *Ranbu*	10. *Raskun*
11. *Koshginta*	12. *Lugurumarpo*
13. *Solocarpo*	14. *Iugurucorpo*
15. *Solomarpo*	16. *Aaba*
17. *Sukpa*	18. *Sadnak*
19. *Vishpangachitabo*	20. *Keecha*
21. *Mano*	22. *Banglak*
23. *Hounglang*	24. *Chainduk*
25. *Deyanku*	26. *Almose*
27. *Taskya*	28. *Skirapa*
29. *Tounjeel*	30. *Sarmetok*
31. *Spangyan*	32. *Champa*
33. *Gonpo*	34. *Ditasanjeen*
35. *Khurcho*	36. *Bokar*

The following also are herbs mostly used in Ladakh by *Amchis* and the local people :

1. *Podophyllum hexandrum* Wall.

Sanskrit name : *Vanya Karkati*

Local-name : *Rodhadri*, Balti :-*Dremmukusu*

Uses: The local tribe "Bakarwal" smear its roots and drink the decoction of this in diarrhoea and liver troubles.

Ladakhis generally use its root in many diseases of cattles. Fruits are some times eaten.

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2. *Rheum emodi* Wall.

Sanskrit Name : *Amalparni :* Unani : *Ruvar*

Local Name : *Ralti* & Ladakhi - *Lachu* and *Chucha*

Uses : In this region three varieties are found. Moorcraft in his famous book "Travels in Himalayas" emphasises the utility of this plant. Since British period it is a source of foreign currency. The plant is also called *Ravand Chini.* Local people use the tender leaves as vegetable. They make garland of its leaves and keep in for drying. Local *amchis* use its roots in addominal diseases and its paste on wounds. Commercially it is collected in sufficient quantity from this region.

3. *Carum bulbocastanum* Koch

Sanskrit Name : *Krishna Jeerak, Jeerakadvaya*

Local Name : Balti : *Thayon, Kalajeera*

Uses : Generally its fruits are used as flavouring agent. Its fruits are also used in abdominal pain.

4. *Carum carvi* Linn.

Sanskrit Name : *Krishna Jeerak*

Local Name : *Kumbhdeek,* Ladakhi-*Konagyaut*

Uses : This is a very common plant in this region. Local People use its seeds as spices. *Amchies* in their therapy use its seeds as *deepan* and *pachan.* Seeds with Yak's butter or mustard oil are used in rheumatism. It is collected commercially.

5. *Chaerophyllum villosum* Wall. ex. *C. acuminatum* Lindle.

Name : *Kala-jeera* (Traditional)

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Uses : local people collect this under the name of *Kala-jeera*. Its use as condiments have also been reported, though, it has no good flavour. Raw drug dealer in Amritsar and Delhi markets adulterate its seeds in *Krishna Jeerak* and its roots in '*Atis*' (*Aconitum heterophyllum*). It is common in the region.

6. *Thymus serphyllum* Linn.

Sanskrit Name : *Vanyavani*

Local Name : Balti - *Tumbra*, *Tumba*

Uses : It is prostrate, aromatic herb. Local people use '*panchang churn*' in abdominal pain and *prasuti vikar* and as the anthelmentic. It is also mixed in the bread prepared from fermented flour.

7. *Heracleum candicans* Wall.

Sanskrit Name : *Kshatra*

Local and Kashmiri Name : *Maladh*, Balti - *Sanphero*.

Uses : Four varieties of this species are found in this region. Local people use it as a foddar. According to them roots of some varieties have poisonous effect therefore, only shoots are used as foddar.

8. *Prangos pabularis* Lindle.

Local Name : *Prongos*

Uses : This plant is commonly available in Dras block of Kargil tehsil. Moorcraft in his book 'Travels in Himalayan Provinces' has thrown some light on its utility as foddar. It is stored as reserve foddar. Seeds are diuretic and relieve abdominal pain. Roots are also used in diarrhoea.

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9. *Ferula jaeschkeana* Vatke.

Sanskrit Name : *Hingu*

Local Name : Kashmiri - *Kaindoor*;

Balti :- *Hotung prongos* Ladakh :- *Tnukn.*

Uses : This plant has milky, sticky, smelling latex. Latex from root is applied on wounds, pimples. In Sonamargy and Zozi La, another species of *Ferula* is commonly met which is called *Kaindool* in Kashmiri and *Ferula narthex* Boiss in Latin. From the local resources it has been brought to notice that the people do not prepare 'asafoetida' (*Heeng*) from this plant. Balti muslims at Gund village near sonamarg prepare asafoetida from the latex from the stem and root. However, sample could not be obtained.

10. *Morina* Sp.

Local Name : *Kandiyari*

Uses: The Bakarwals use its scented roots for cure of abscess. Flowers are also aromatic and whole plant is considered to be poisonous.

11. *Achillea millofolia* Linn.

Sanskrit Name : *Virajseep*, Ladakh :- *Saijum.*

Uses : Local *amchies* use whole plant in gastritis and fever.

12. *Rosa eglapterila* Linn. and *Rosa webbiana* Wall.

Sanskrit Name : *Sevitee*

Local Name : Balti :- *Chharmang*, *Starge*,

Ladakhi :- *Sebeamitok*

Uses : Local *amchies* use its flowers in headache and *pitta Vikar* Ripened fruits are eaten. Iocally on the basis of the

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colour of flowers, it is divided into three varieties. Yellow flowered rose is used in preparing bread. In Ladakhi language red, yellow and white colours are called as *karpo*, *marpo* and *mukpo* respectively.

13. *Colchicum luteum* Baker

Sanskrit Name : *Suranjan*

Local Name : *Kapichum*

Uses : This plant is not in common use, but local people eat its roasted bulbs. It is sweet in taste and is a tonic also. A bitter variety is also found in this region.

14. *Chenopodium botrys* Linn.

Sanskrit Name : *Vastuk, Sugandh Vastuk*

Local Name : *Nigu, Hama*

Ladakhi : *Sgyun, Janchi, Karpo*

Uses : There are several species of *Chenopodium* besides mentioned one. Local people of Dras area administer its *panchang* powder with milk in *Vata prakopa*. Local *amchies* use these plants in stomatitis, liver diseases and *pitta vikar*. It is also considared anthelmentic, diuretic and laxative.

15. *Gentiana moorcraftiana* Griseb.

Gentiana thomsoni C.B. Cl.

Gentiana tonella Roth

Gentiana kurroo Royle.

Sanskrit Name : *Tikta, Tryamanabhed*

Local Name : Balti :- *Dhuviting, Chhugiting.*

Ladakhi : *Tkta, pagoin.*

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Uses : Local people and *Amchies*, generally use all species in their therapy. They consider *Tikta* in 5 froms viz. *Chagtik*, *Gyatik*, *Samuchutik*, *Jantik*, and *Palatik*, Their *Gyatik* form is '*Kirattikata*' and *Tryamana* (*Pagon*) of Ayurveda. *Pagon* has the local varieties known as *Munpo* and *Kanchchhung*. *Amchies* use the decoction of this plant in fever and as blood purifier in *pitta vikar*, *kasa*, headache.

16. *Gentiana* Sp.

Sanskrit Name : *Trayamana* (*bhed*)

Local Name : *Spangyan ganpoo*

Uses : As per colours of flower, black is called *Nagpo*, blue is *Gonpo*, and white is *Garpon*. They use this plant in throat and lung diseases. In throat disease it is used with seven other drugs e.g., *Spangyan*, *Katurlisi*, *Chugkong*, *Kurkun* etc. This is also used in '*pratisayhya*'; '*galshnudi*' and '*jwarahara yoga*'

The plant occurs near snow line and blossoms just before snow fall. There are many folk songs prevalent in praise of this flower.

17. *Swertia cordata* Wall.

Swertia petiolata Royle.

Sanskrit Name : *Kiratatikta*

Local Name : *Gyatik*

Uses : Local *amchies* use decoction of whole plant in *rakta vikara*, *paitik vikara* and in *jwarahara yogas*.

18. *Oxyria digyna* Mill.

Sanskrit Name : *Chukri*

Local Name : Balti : *Suma. Chucha*;

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Ladakhi :- *Chumcha*

Uses : Local *Amchies* regard it as' *amlatraya dravyas*'. They use it as *deepana pachan* and in abdominal diseases. This plant is acidic in taste and the leaves are used as vegetable.

19. *Trigonella emodi* Benth

Medicogo sativa Linn.

Medicago fulcata Linn.

Sanskrit Name : *Ashvabala*

Local Name : Balti :- *Hispit, Jaroi hispit.*

Ladakhi :- *Booksut.*

Uses : These plants are commonly used as foddar. Moorcraft in 'Travels in Himalayas' has not mentioned any use of the plants; probably it is '*Ashvabala*' of Ayurvedic literature.

20. *Artemisia maritima* Linn.

Artemisia absinthium Linn.

Artemisia sacrorum Ledeb.

Sanskrit Name : Kitmari, *Unani-Aphasantin*

Local Name : Balti :- *Burse; Nurche.*

Ladakhi :- *Khamba, Phurkar.*

Uses : Plant generally occur, on dry places. Local people use this plant in gastric diseases and '*Aphara*' in animals, It is used as antiseptic and vermifuge in the form of powder and also used as haemostatic on wounds and cuts.

In Nubra valley it is added to prepare a narcotic drink called *Chhang.* Although roots are used as fuel but it is believed that the smoke produce lungs and eye diseases and some times it produce headache.

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21. *Hyoscyamus niger* Linn.

Sanskrit Name : *Parsik-yavani*

Local Name : Balti :- *Vanga, Phagun*

Ladakhi :- *Langtang, Langthagcha.*

Uses : The plant occurs in Kargil range and considered poisonous. Other species *Hyoscyamus pusillus* occurs in Kherbu, Kargil and Khalsi. Local *amchies* consider it among three important vermifuge drugs and called '*Chesum*'. These are *maruche* (*Palas-seeds*). *Langthagcha* (*Parasikyavani*) and *Chitang* (*Vaividang*).

22. *Physochlaina praelata* Miers.

Local Name : *Langtan, Datura*

Uses : This plant is very common in the region and extends upto 3,400 meters. It is considered poisonous. Even one root is sufficient to produce mental disorder. According to chemical researches its leaves contain Hyoscymine and Hyosine. It has good demand in the foreign countries.

23. *Dosma bracteatum* Wall.

Sanskrit Name : *Ratanjyot*

Local Name : Balit :- *Gremok:*

Ladakhi :- *Demok.*

Uses : Local *Amchies* count it among three red colour *Dravyas* which they call '*Marposum*'. The plant is used to check blood vomitting and lung diseases. It is also used as a hair dye with *ratsejao* (*Akasbel*) and '*Demok*' and some oil.

24. *Cuscuta capitata* Roxb.

Cuscuta europeea Linn.
Sanskrit *Name :* *Aksavalli;* Unani :- *Aftimuu.*

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Local Name : Balti :- *Ratsejago;*

Ladakhi :- *Tistasanjeen*

Uses : In Dras area this plant is used as a hair dye and to lengthen the hairs. *Amchies* use it in v*at vyadhi* and *pakshaghat* with other 25 components which form a '*Yoga*'.

25. *Ephedra gerardiana* Wall.

Ephedra intermedia Schrenk.

Ephedra major Host.

Sanskrit Name : *Somkalp* (Trade name)

Local Name : Balti : *Chefat.*

Ladakhi : *Chefat, Chedum, Cheldug.*

Uses : These are easily available on rocky slopes. *Amchies* use it in liver and blood diseases. Wood is also used as tooth brush.

26. *Allium govaniam* Wall.

Allium schoenoprasum Linn.

Local Name : Balti :- Vilakho

Ladakhi :: *Skiche*

Uses : Whole plant is aromatic and given with milk to ladies after delivery. Root and leaves are used as vegetable. It is *deepan-pachan* and useful in constipation.

27. *Tribulus terrestris* Linn.

Sanskrit Name : *Gokshur* ; Unani : *Kharesvask.*

Local Name : Balti : *Kokosok*

Ladakhi : *Jema.*

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Uses : It occurs in Kargil, Leh and Upshi area. Local *amchies* use its seeds in Kidney troubles and pain. It has also antifertility properties and may be useful as an oral contraceptive.

28. *Malva sylvestris* Linn.

Malva verticillata Linn.

Unani : *Khuba*

Local Name : Balti : *Sochaling*

Ladakhi : *Chhampa*

Uses : Seeds of both these species are used in *Kasa*, lung troubles and to *pitta vikar* along with some other drugs.

29. *Orchis latifolia* Linn.

Sanskrit Name : *Salpa*

Local Name : Balti : *Bohnga*

Ladakhi : *Banglakh*

Uses : This plant occur in Dras, Suru ghati and Sapila areas. Tubers are used as aphrodisiac and important constituent in many other medicines.

30. *Picrorhiza kurrooa* Royle

Sanskrit Name : *Katuki*; Ladakhi : *Hauglang*

Uses : This plant occur in Zozila-La, Sapi-La and Suru areas. Root and stem are used in liver and stomach troubles. Some times alongwith other components it is used for fever and "*Pitta-Vikar*"

31. *Prunella vulgaris* Linn.

Unani Name : *Ustura Kudoos* ; Balti ; *Syangava*

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Uses : No particular use has been observed but some muslims use flowers and leaves in gastric diseases and in mental disorders.

32. *Cicer sengaricum* Staff.

Sanskrit Name : *Rudanti*

Local Name : Balti: *Sarigonga*,
Dardi-*Mar khurvani*
Lada8hi :- *Thackutkar*, *Kungyatapa*

Uses : It is a prostrate plant, appears like gram; is acidic in taste. It occurs in Bembat-streams. Suru valley and Khardungla in Dras block. Local people lat its unripin legumes.

33. *Astragalus munroi* Benth.
Astragalus rhizanthus Royle.
Astragalus himalayanus Klotz.

Sanskrit Name . *Rudanti;* Ladakhi; *Sadanak*, *Satkar*.

Uses : Botanically 15-16 species of the Genus are found. Some of these are used by *amchies*. Whole plant is used in *shoth; jalodar*, *nidranash* and in general debility. One species called *Cheechharamo* is used in manufacturing the local paper.

34. *Mentha sylvestris* Linn.
Mentha arvensis Linn.

Sanskrit Name : *Puteek*

Local Name : *Phalolin*, *Chhiruk*

Uses : Plant occurs throughout Ladakh. Leaves powder is used *deepan-pachan* and whole plant is used in *adhaman* diseases of cattles.

35. *Aconitum heterophyllum* Wall.
Aconitum violaceum Jacq.

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Sanskrit Name : *Ativisha, Atis.*

Local Name : *Buans Ponkar*

Uses : This plant occur in Kargil, Zanskar and Nubra ranges, particularly in Suru valley, Sapi-La and Karja. *Amchies* use its root in abdominal diseases, diarrhoea and fever. According to them on the basis of colours, it is of three kinds viz. *Pogkar* (White) *Bongmar* (Red), and *Poggsar* (Black).

36. *Aconitum nepalles* Linn.

Sanskrit Name : *Vatsnabh, Vish*

Local Name : *Bougnak*

Uses : This plant occurs sporadically in Kargil and Zanskar ranges. *Amchies* use its roots in fever and gastric troubles. Morphologically they consider its varieties as *Chaintuk*, *Hala Duchiloma*, *Junva* and *Ratuk*.

37. *Hippochae rhamnoides* Linn.

Balti-*Kantha, Kaghatha*, Ladakhi :- *Shrman. Tarubu.*

Uses : *Ghan satva (Khanta*-Ladakhi) of fruits alongwith sodium bicarbonate (*Pul*) and few other drugs and applied for '*Pitta-vikar*' and '*Troma*'. It is also used as one of the componets in bronchial asthama.

38. *Convolvulus arvensis* Linn.

Local Name : Balti-*Tiktikmon*; Ladakhi-*Siguvan.*

Uses : Though this plant has no traditional use but some times roots are used in tympanitis and as purgative.

39. *Capperis spinosa* Linn.

Sanskrit Name : *Vyagra nakhi*

Local Name : *Kabra; Allmose*

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Uses : It is perennial shrub. Unripen fruits are used as vegetables and ripen fruits are used by local *Amchies* in dismenorrhoea alongwith several drugs. Root is also used in *Kasa* spleen disorders and as an anthelmentic.

40. *Peganum hermala* Linn.

Unani Name : *Harmal*

Uses : Roots are anthelmentic. Seeds are considered poisonous and abortificient.

41. *Centaurea depressa* Bicb.

Local Name : *Pasaka*

Uses: Local *Amchies* use stem and leaves in chest pain, *kas*, fever, headache, abdominal troubles, bile troubles and as a blood purifier. It is widely used in Tibetan system of medicine.

42. *Nepeta longibracteata* Benth.

Local Name : *Diyanku*

Uses : Flowers and leaves are much used in several diseases. Flowers are considered to be useful in abdominal and liver troubles ; as haemostatic and antiseptic. *Bhasma* of *Cheonji* alongwith *manu (Inula racemosa)* and *Diyanku* are powered and administered oraly in joint pains ; tympanitis, hyperacidity and headache. It is also useful in hill diarrhoea.

43. **Local Name** : *Parpata*

Uses :This plant appears like *pittapapra*, found as weed and is bitter in taste- It is useful in fever, bile diseases, blood diseases abdominal diseases ; and infective fever.

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44. **Local Name :** *Payaschava*

Uses : This plant is common in Ladakh area. Roots are used in lung diseases and to control 'Pus' formation. It is also useful in Cancer and heart diseases. Leaves are used for healing wounds.

45. *Plantago major* Linn.

Plantago tebetica Hook.

Unani Name : *Hamvaz, Vartang ;* Ladakhi *Jharam, Naram, Smaran (Rambu).*

Uses : It is of three kinds viz. '*Jharam*' '*Naram*' and *Smaran.* Seeds are used in gastric complaints, burning sensation in stomach and in dysentry.

46. *Caragana cuneata* DC.

Local Name : *Gyargal, Takaya, Takayganpo*

Uses : It is highly aromatic. Leaves are used for healing wounds, cure of sinusitis; as *visaghna* and *kasaghna*; used internally as blood purifier and externally for healing of wounds, and also in burning sensation of throat and gastric cancer.

47. *Euphorbia thomsoniana* Boiss.
Euphorbia tibetica Boiss.

Sanskrit Name : *Swarnkshiri*

Local Name : *Tharnu, Hrivi*

Uses : *Amchies* use its latex and roots as purgative. Latex of *Euphorbia thomsoniana* (*Hrivi)* is applied for skin diseases. According to some scholars, it may be '*Swarnkshiri*' of Samhitas.

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48. *Saussurea schultzii* H. f.

Sanskrit Name : *Brahma kamal*

Local Name : *Spangohitaho*

Uses : Plant occurs on high altitudes. *Amchies* use its leaves and flowers in liver, throat, bile troubles and mental disorders.

49. *Saussurea* Sp.,

Local Name : *Pangchi ; Habbare*

Uses : The plant occurs on higher elevation. *Amchies* use this plant like aforesaid species.

50. *Delphinium brunonianum* Royle.

Local Name : *Chargospos ; Ladarmaintok*

Uses : The plant occurs on passes. Bakarwals considers it as poisonous. Flowers are used in throat diseases.

51. *Delphinium kashmirianum* Royle.

Local Name : Balti :- *Vilamunduk*
Ladakhi :- *Tichuloma*

Uses : In Tibetan therapy its flowers are used like *Vatsanabh*, flower and in throat complaints.

52. *Corydalis flebellata* Kdgew.
Corydalis tibetica Hk.f.

Local Name : *Tongil, Gyatukmasaerapo*

Uses : Used as a component of a *Yoga* for fever. *Corydalis flebellata* is used as fish poison.

53. *Cruciferae*

Local Name : *Solocarpo, Khilchecarpo*

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Uses : Tubers are used as cooling agent in lungs and in gastric diseases.

54. *Potentella* Sp.

Local Name : *Toma*

Uses : Roots are edible and considered as tonic.

55. *Potentella fruticosa* Linn.

Local Name : *Sonmayaspa*

Uses : Plants occur on higher elevations. Its use is similar as tea leaves.

56. **Local Name :** *Lengae.*

Uses : It is used as substitute of '*Madhyasti*'.

57. *Tragopogon* Sp.

Local Name : *Raiskun*

Uses : Plants occur on higher elevation. Used in blood and gall bladder troubles.

58. *Aster* Sp.

Local Name : *Lungmik*

Uses : Occurs on snowy slopes. Flowers ore used in disorders of digestive system, *rakta* and *kaphavikara.*

59. *Saussurea* Sp.

Local Name : *Gyalvachen*

Uses : Plants occur on snowy slopes. flowers are used in lung diseases and *Pittavikar.*

60. *Taraxacum officinale* (Walp) H.f.

Sanskrit Name : *Dugdhipheni ;*

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Local Name : *Khurchot, Pangchi*
Lactuca Sp. (Local-*Chathis*)
Lactuco crepis (Local-*Stakis*)

Uses : Whole plant is used to produce vomiting; used as *jwarghna, rakta-doshahara* and *pittavikarhara.*

61. *Pedicularis longiflora* Rodolph.
Pedicularis bicornuta Kiet.

Local Name : *Lugurucarpo*

Uses : It is of three varieties, according to the colour of flowers i.e., *Swetha, peeta, rakta.* Flowers are used for *jalodar* and *shoth.*

62. *Sedum tillaeoides* Duthie
Sedum tibeticum Stracheyi

Uses : Plants occur on snowy slopes. According to the colour of flowers it is of four varieties. Leaves are used as vegetable. Roots are *vamak* and *kaphagna.*

63. *Sonchus asper* (Linn.) Mill.
Sonchus oleraceus Linn.

Local Name : Whole plant is used in *rakta dosha, charam-vikar* and on pimples.

64. *Clematis orientalis C. acutifolia* Hk. f. & Thomas.

Local Name : *Balti* :- *Khuta*; Ladakhi :- *Emong.*

Uses: Leaves and fruits are used in skin diseases, it is applied alongwith *Emong, Chechhe* and *Sukapa.*

65. *Capsella thomsoni* Hook. f.

Local Name : *Snankhapa, thak-thuka.*

Uses : Seeds with mustard oil are applied externally in *sheetpitta.* It is also used as blood purifier.

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66. *Papaver nudicaule* Linn.
Meconopsis aculeata Royle.

Local Name : *Sarchhing, maituk, chhairunun*

Uses : These plants are used as blood purifier and useful in hypertension.

67. *Ranunculus hirtellus* Royle

Local Name : *Supkha, Chaichha*

Uses : Decoction of all three varieties (*Emon, Chaichh* and *Suppa)* are used for washing wounds. Whole plant is used in skin diseases with mustard oil.

68. *Tragopogon* Sp.

Local Name : *Khanatum, Singhastun, Cha-astun.*

Uses : The plant is used in moxibustion.

69. *Thalictrum minus* Linn.

Local Name : *Chaugu, Smochasque*

Uses : Roots are yellow in colour and are used in conjunctivitis.

70. *Nepeta* Sp. (Two species)

Local Name : *Jipchi*

Uses : Plants are aromatic like lavender and used in eye diseases.

71. **Local Name** : *Charaknugma, Charungma*

Uses : Whole plant is used in lung disorders and *kasa.*

72. *Tanasetum tibeticum* Hk. f. & Th.
Tanasetum gracila Hk. f, & Th.

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Local Name : *Purnak, Khankar*

Uses : Plant is used in colic and ear disorders.

73. *Inula racemosa* Hk. f.

Sanskrit Name : *Puskarmul*

Local Name : *Manu*

Uses : Roots are used in gastric disorders and rheumatism.

74. *Polygonum* Sp.

Local Name : *Rambu*

Uses : Roots are used as blood purifier and as a component drug in many *yogas*.

75. *Primula denticulata* Hk.
Primula elliptica Royle

Local Name : *Chhurkang, Keecha*

Uses : Flowers are used in *kasa* and in *angamarda*

76. *Betula Utilis* G. Don.

Sanskrit Name : Bhurj*a*

Local Name : *Balti : Takpa.*

Ladakhi Name: *Tronga*

Uses : *Bhasma* prepared from the stem bark is used in rheumatism and as heating agent. Plant juice and fungus infection on stem (*Bhuj gada*) are used as abortificient.

77. *Berberis ulicina* Hk. f. & Th.

Sanskrit Name : *Daruharindra*

Local Name : *Kiraring Khicharma*

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Uses : Root extract (Ladakhi-*Skerpa*, Ayurvedic-*Rasanjan*) is used in piles and as haemostatic agent.

78. *Myricaria gemenica* Var. *prostrate* Hk. f.

Local Name : Balti :- *Umbrookh;*
Ladakhi:- *Umbu.*

Uses : Decoction of leaves and stem bark is used by *Amchies* in *rakta vikar, pratishyaya* and *ardhavabhedaka.*

79. *Ulmus parvifolia* Jazq.

Local Name : *Youmbak*

Uses : Paste of the stem bark is applied for lengthening and softing of hairs.

80. *Eleagnus hortensis* Bieb.

Local Name : *Sarching*

Uses : It is sacred plant of Lama. Generally they keep flowering twigs in Gumpa. Seed Oil is *kasahara.*

81. *Juglans regia* Linn.

Sanskrit Name : *Akshod*

Local Name : *Starga*

Uses : Villagers use fruit kernals as dye, Edible part, after roasting is used with tea in *kasa roagas.* Root bark is used as a tooth powder.

82. *Rhododendron anthopogon* D. Don.
Rhododendron campanulatum D. Don.

Sanskrit Name : *Saireyak (bheda)*

Local Name : Tanli; *Tama*
Balti:- *Tajagseng.*

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Uses : *Amchies* use flowers and leaves in fever and *kasa*, leaves are considered to be *ushna*.

83. *Juniperus communis* Linn.
Juniperus recurva Ham.

Sanskrit Name : *Haver;*

Local Name : *Sukapa; Dhoop.*

Uses : *Amchies* use leaves as incense.

84. *Solanum nigrum* Linn.

Sanskrit Name : *Kakamachi*

Local Name : *Sukalo*

Uses : Juice of ripen fruit is used as cosmetics.

85. *Nepeta* Sp.

Local Name : *Skiling*

Uses : Local people use its stem and leaves as ripening agent for *khumani*. They believe that through this process fruits are completely preserved too.

Treatment by Mineral Drugs :

A good number of locally available minerals are also used in combination with herbs for a number of diseases. The minerals are : *Sheelajeet* (*Brakjun*); *Gandhak* (*Munji*); *Tankan* (*Chhala*); *Jaharmohora* (*Mecchè*). Sodium bircarbonate (*Pul*); *Yavvakshara* (Sodium Sulphate), *Hartal* (*Dongris*), *Sphatica* (Quartz) *Yanchi*, *pla*, *Chunji*, *Serche*, *Badrasma* (*Manjhira*), etc., are few salts and stones found in this region.

Therapy by mineral drugs is as important as the therapy by the plants. It is a known fact that certain areas in Ladakh are full of minerals and rocks like Gold, Copper, Asphalthum,

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Harital Godanti, *Tankan*, Sodium bicarbonate, Sulphur and many other precious stones. At some places magnetic iron has been reported. Some of the minerals collected during the survey are as under :

1. **Asphaltum**

Sanskrit name : *Shilajeet.*

Local name : *Brakjan*

The samples were collected from steep rocks near Hardas village in Kargil Tehsil. Asphaltum is blackish in colour and smelling like cow's urine. As per consultations with *Amchies*, the superior quality of *Shilajit* is found on the hills 'Lamayuru', Khalsi (Skitiyang), samples of which have been obtained from local people.

Shilajeet is an imported mineral drug. Ladakh is reputed since times immemorial for its *Shilajeet.* It is very much used in a number of ailments and diseases in ayurvedic and unani system of medicine. It is also prized as a medicine in the treatment of sexual debility.

It is a natural substance of dark colour paste like thing found on the high rocks. It burns like a petrol and gives black smoke. Recently, this substance was tested by Prof. Alayov at Moscow, who revealed that this substance had all the qualities needed for a medicine for vitality and vigour.

Shilajeet, which is in Ladakh known as *brakjan* is found in muslim inhabited Ladakh in places like Hardaspur, Suru valley and Boodh kharboo and in Buddhist inhabited Ladakh, in Lamayuru and Skitiyang.

Extraction of Shilajeet in Muslim Inhabited Region :

It is said, that two years ago, few army persons of Gorkha regiment reached a village about 4 Kms. from Kargil known as

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Hardaspur, which is famous for apricots and apples. The army people knowing the importance of *shilajcet*, enquired about it from the local people of Hardaspur about its occurence. They, themselves, surveyed the area and found some *shilajject* mixed with the faeces of a mountain mouse locally known as *thattar*. It is said, that, the mouse collects and eats *shilajeet* which occurs in the mountain rocks. The mouse brings *shilajeet* and excretas over it, so that, the *shilajeet* is struck to the faeces and dries up.

The Gorkha army men, collected the excreta and asked the villagers, to boil it with water and cow's urine and then to strain. The strained portion was again boiled till it became semi-solid. The villagers thus have learned the technique of preparing *shilajeet*. Presently they were selling *shilajeet* @Rs. 10/- to Rs.14/- per 250 gms. They further told that they have extracted more than a maund of *shilajeet* from the region and sold.

Shilajeet from Buddhist Ladakh :

In the Buddhist inhabited region *shilajeet* occurs in Skitiyang, which is about 40 Kms. from Khalsi and this *shilajeet* is considered by the Ladakhi people as the best quality. The extraction of *shilajeet* in this region is very peculiar. Whenever, a rock of *shilajeet* is found from which *shilajeet* oozes, as a black or brown solid porous mass, the rock is aimed with a gun and bullet is fired. The bullet strikes the porous mass and it falls down, and this is collected. This technique is practised only in the places, where *shilajeet* rocks are unappproacheable. The porous solid mass is boiled in water and strained. The strained portion is again boiled to semi-solid consistency and is brought to Khalsi market for sale. Khalsi is the centre for *shilajeet* were it is presently being sold @ Rs. 8/- per 10 grams and inferior quality @ Rs. 1/- per 10 grams.

In Ladakh, the *amchies* distinguish 5 kinds of *shilajeet* viz. *Serjoon* (Goldon), *Mooljoon* (Silver), *Jagenjoon* (Copper),

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Jangejoon (Lead), *Changjoon* (Iron) Among these *Serjoon* is supposed to be the superiormost and *Changjoon* as the inferiormost quality.

2. **Sulphur**

Sanskrit Name : *Gandhak*

Local Name : *Muji, Munji*

Sulphur occurs in Pugga valley 160 Kms. from Leh, and also in Chumathan (Neuma tehsil) near hot springs. Regional Research Laboratory, Jammu has set up a plant in Pugga for purification and separation from Borax mixture. Local *amchies* use it in their therapy.

3. **Borax**

Sanskrit Name : *Tankan*

Local name : *Jaichha Chhalal*

Borax is abundantly found in 9-12 square Kms. area of Pugga valley area and adjacent to hot springs. It is near whitish in appearance and is also used by *amchies* in their therpay. Regional Research Laboratory, Jammu has set up Borax plant in Pugga valley.

4. **Sodium Sulphate**

Local Name : *Yopyahyara*

This salt is found in Tsokar lake 5200 m between Leh-Manali road, about 55 kms. from Upshi after crossing Tanglang pass. This area is known as Rupse (village of highest bakarwal tribes). This village is considered to be one of the highest in situation (4800 m.) in the world. This salt is used by *amchies* in their therapy.

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5. **Antimoni Sulphate**

Sanskrit name : *Anjan, Sauviranjan*

Local name : *Tinchha*

This mineral is found in inaccessable places of Squya and Marka villages. It is black and shining and also known as leadsulphate. This mineral is used by *amchies* in their therapy.

6. **Sodium Bicarbonate**

Local Name : *Pul*

This salt has been located in an open grassy field about 3-4-Kms. from Panamik in Nubra valley. The place is known as puththang. Local people use it in diet and tea preparations. *Amchics* use it in indigestion. Besides this, magnesium salts are found in Somori lake.

7. **Yellow Arsenic :**

Sanskrit name : *Pindahartal*

Local Name : *Pala, Pabla* (*Dongrus*)

This mineral is found in Zanskar area. Perhaps it is ore of arsenic and sulphur. Lamas use it as colouring for decorative purposes of Gumpas. It is also used by *amchies* in their therapy. In Pugga valley white and shining *Godanti hartal* (Calcium sulphate) has also been found.

8. **Local Name :***Tuji : Doaa-Chholo*.

It occurs in squya and Marka areas. *Amchies* use its Oxide (*Bhasma*).

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9. **Serpentine**

Common Name : *Jaharmoor*

Local Name : *Melche*

It occurs in Bodh kharbu, Dras, and in Nubra valley. Local people prepare bowls and tumblers for presentation to their *Gurus* : 'The Lamas'. Besides this soap stone (Magnesium silicate) is also found at some places.

10. **Sanskrit Name :** *Badrashma*

Unani Name : *Hazrul*

Local Name : *Manjjira*

Local *amchies* use this in their therapy.

11. **Quartaz**

Sanskrit Name : *Sphatica*

It is found at some places in the areas. Few samples of transparent qualilty have been collected. Perhaps it is *shailabha mani* (rock crystals). Besides this there are many minerals and rocks yet to be identified from the Ayurvedic point of view.

a) **Chanji**

It occurs near lakes and hot springs. Locally these are called *phechung*, *chonji*, *machung chonji*, *puchenji* and *manic chonji*.

Oxides of all these are used by *amchies* in treatment,

b) **Dhojo :**

It is a rock perhaps fossil. There are several kinds of such rocks, Locally called *Dhojo*, *Khapho*, *Dogi*, *Thingi*, *Detug*, *Banu* etc.,

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c) **Dhorgis :**

It is also a fossil. There are many kinds i.e. *Dogi*, *Thingi*, *Chamava*, *Dhothi*, *Dorul*, *Dopangsu*, *Nemakhanchu*. Oxides of these are used by *amchies* in *Adharang* and *Aamvata*.

d) **Serche :**

It is a brown powdery rock collected from a lake near Khardung in Chumathan block. This powdery substance is used by *amchies* as diuretic.

In this area calcium stone, marbles-black, red and brown coloured have also been located. Rocks in the area are constituted of volcani chromides, quartz and sedimentry stones.

Treatment by Animal Parts : Organotherapy :

This treatment is quite prevalent in Ladakh and it is actually the employment of the organs of animals or man as remedial agents in healing the body and its ailment. The *amchies* keep in their medicine bags animal organs like dog or wolf tongue, antelope horns etc. In man's organ, if available, the *amchi* takes the heart, fresh blood of a person who has died in an accident or infighting. This, they use in epilepsy. The other animal parts they use are; dog or wolf tongue, for tongue diseases etc. The bile of the bear is used for pulmonary affliction and the fat of '*Marmot*' or '*Phiya*' (*Arctomya hemachalanus*) for rheumatism. One of the most important use of the animal part is the use of Tiger's flesh. They say, that they can prepare recipe for family planning, either for 1 month, 1 year or for ever. It is worth experimenting by making available the tiger's flesh for the studies.

The other parts of the animals that are used are snake's flesh in rheumatism ; rabbit's heart for epilepsy, and bile of tiger and leopard in pulmonary and bronchial diseases.

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Treatment with Mineral Water :

Sulphur and mineral springs are frequent in some parts of Ladakh. Treatment of rheumatism by sulphur spring water is much sought by the people who suffer from rheumatism. It is said that one has to remain for some days to several hours in water to get rid of this disease. Besides sulphur spring there are mineral springs and these springs only flow at certain seasons of the year, If by chance they flow at other times the water has no medicinal property. At one place near Leh. a spring water was located and the loeal people use it in the treatment of headache

Sulphur springs are at Pugga, Chumathan, Nubra and Panamick and Serchan in Dras.

The water from the spring stream is poured on the head of the patient and other diseases of brains.

Puncturing of Veins : (*Chau*)

This treatment consists of pricking the patients body with needles at certain points believed to be connected with visceral orgrns causing a physical disorder. In this they allow the blood of the body to ooze out for certain time. For this they keep a chart for their guidance in which the important points of the body are shown. Usually this therapy is employed for gout, blood and skin disorders.

Treatment by Moxibustion (*Ladho-Maltsa*)

Both forms of therapy are taken from the Chinese and Ayurvedic systems of medicine.

In moxibustion the flower heads of *Anaphalis* or *Gnaphalium* Sp. which are wooly in structure, animal horns, iron,

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Treatment by mineral water

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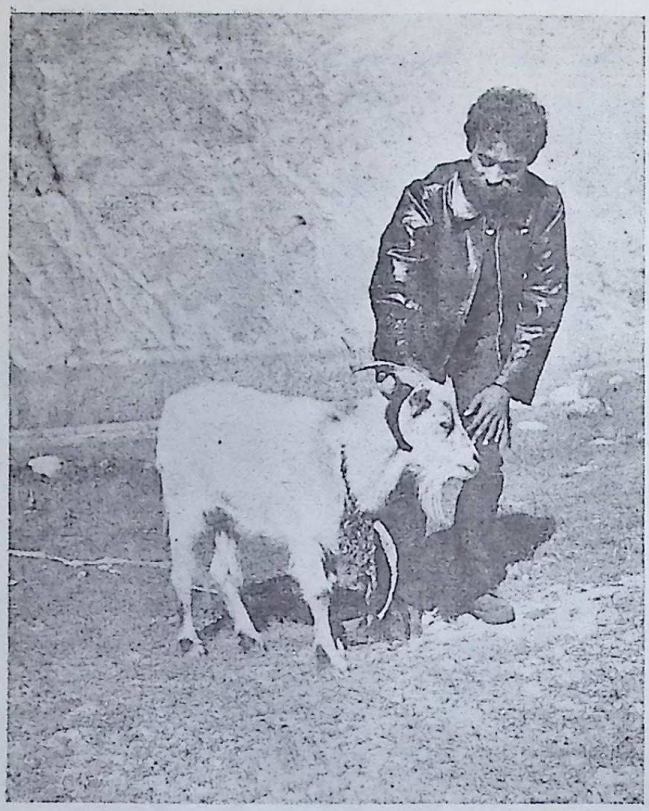

Pashmina goat, a source of high quality wool (Pashmina), speciality of Ladakh

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gold, silver needles locally known as '*Merden*' and '*Torme*' are burnt or heated and placed at certain parts of the body. The use of different material depends on the types and seriousness of the disease. Mostly these are used in headache, paralysis, inflamation of the joints, arthrites etc.

Treatment by Mysticism *(Yantra Mantra)*

Treatment by mysticism (*Yantra Mantra*) is said to be inseparable from the study of the occult influence of stars on human destiny. Therefore, an expert, they say is capable only of diagnosing what is physically wrong with the patients but also of reading his future and that of his close relatives. This therapy is known as '*Ompo*' equivalent to *jyotish* in Sanskrit. Generally, *amchies* are well versed in this science, They treat the patient by looking at the horoscope for their evil and good stars and on this basis prescribe amulets suitable to the nature of the trouble. Inside the amulets *mantras* are written.

Treatment of disease through *Shamnastic* is also common in Ladakh. The *Shamnastic* people are known as '*Ihava*'.

Medical Manuscripts and '*Yogas*' of *Amchi* System :

The team collected information relating to the rare medical literature which is not available elsewhere, from the local *amchies* and from the monasteries. Those manuscripts are in Tibetan and Bhot scripts. The names of the few manuscripts are given below :

1. Lanthapp
2. Durchipungjas
3. Segyuta
4. Chagyuta
5. Chhalachavyata
6. Lemik
7. Shrigyuttaji
8. Lanthap pande engave

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9. Semegyuta
10. Samengyuta
11. Vyasangone
12. Durchisigano manlak gyatpaetc.

Among these, the four medical manuscripts viz Lanthapp, Sagyuta, Semegyuta and Chagyuta are known as 4 Bindu and are learnt by heart by the students who want to qualify themselves in the science of *Amchi* System.

Some of the important *yogas* described in the above stated books which are commonly administered for various diseases are the following :

1. Medicine for Headache :

Sirmetok (Wild *Memordica* Flowers) *sevemetuk karpoo* (white rose) and *Herura* (*Harar*) are finally powdered and seived through cloth, a paste is made with water and made into pills. 2-4 pills are taken in accordance to age.

2. *Kasa* and *Rakt-Pradar* :

Manu (*Puskarmul*), *Pasaka* (*Centaurea*) *Givand*, *Skuruva*, *singer* (*Manistha*), *Skiru* (*Ghan-satva of Tarbu*) are powdered and sieved. Sugar is added to this powder. 6 *rati* to 1 *masha* is given in *rakta pradara* and *kasa.*

3. *Agargyatapa Yoga* (*Yoga* **of 8 Drugs) :**

Aguru (*Agar*), *Jati* (*Jaipal*) *Skijosa* (Ambarash), *Chukandh* (*Vanaslochan*), *Shyokar* (*Rel*), *Ruta*, *Harura* (*Harar*), *Nagkeshar* (*Shalmali* flower), are powdered and sieven. This medicine is applied on Trauma, mental disorders and chest diseases.

4. *Sardog Sanpa* :

Combination of *haruru* (*harar*) 1/4 kg. *sermegurpak* (seeds) 1/8 kg, its flowers 50 gms. *sindu* (*anardana*) 1/8 kg. *bragjoon*

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1/8 kg. considered to be useful in colicky pain and diarrhoea.

5. **Thick** *Chedunpasak* :

In this *thumchies* (*bagpitta*), *sermatug* (*Momordica*) *flowers rugmuyung* (*indrayan*), *lujan* (*Buvenjisa*), *raskun*, *buvankarpo* (*atis*), are powdered and sieved. This medicine is useful in diarrhoca.

6. *Sgonchnchhyogyat :*

This is an yoga made usining 18 drugs and is considered to be useful in the treatment of inflamations and heart diseases.

7. **Yoga For Rabbies :**

Muji, *Switang* (*Vancha*), *Dongrus* (*Pind hartal*), *Stavan* (*Mamsa* of horse leg), *Chising* (Pig fat), *Buaamganpo* are powdered and sieved. This powder is administered as *pradhaman nasya* process and also applied on the spot of bite.

8. *Surichil Lurikar Yoga :*

Banu (*Urdojo*) *Bhasma* 1/4 Kg., *Gyaskya* (*Kapoorkachari*) 1/8 Kg., *Kharucha* (*Kalanamak*) 1/8 Kg., *Tarbu* 1/8 Kg., *pippaline* (*Pippali*) 1/8 Kg., are powdered, sieved and used in the treatment of flatulence and gastric troubles.

9. *Toksman Chuan Yoga* :

Emong (*Jal Dehary ak*), *Rali* (*Talis bhed*) *Chungi Bhasma* are powdered and placed in a earthen pot, and small quantity of *Chhang* (narcotic drink) is poured alongwith *ponker* (*vish*). After certian duration these durgs are taken out and powdered *Chhabasu* (*trikatu*), *Jati* (*jaiphal*) and *Manu* are mixed. They

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consider it to be useful in constipation, *amlapitta* and *mandagni*.

10. *Thaklokunsel* :

Spangchi (*Bharma Kamal*) 250 gms., *pale Rha* (*Musta*) 125 gms., *Drasun* (*Triphala*) 250 gms., *Manu* (*Puskarmul*) 250 gms., *Ruta* (*Kuta*), 125 gms., *Chukand* (*Vamslochan*) 50 gms., *Solocarpo* 50 gms., *Lipties* (*Guduchi*) 125 gms., Demokh (*Ratanjot*) 125 gms., *Gymaskis* (Lac) 50 gms., *Chot* (*Manjistha*) all those are powdered and sieved. Powder in doses of 2-3- gms., is given in *urahakhshata*, *kas* and trauma.

11. *Vatavyadhi* **and Eye Diseases Yogas :**

Dead snake is incised and kept for drying and afterwords small quantity of musk is added in *Chhang*. The dried snake is kept into and later on fried and made into *Bhasma* alongwith certain drugs. This *Bhasma* is used in *Vatavyadhi* and eye diseases by *amchies*. This yogı is mentioned in the book 'Setagyut'.

This list of few important plants, minerals and formulations is as under :

Plants			**Indications :**
i) *Rudanti*	*Sadhnka*	—	T. B. Asthama, and general tonic.
ii) *Peshaka*		—	Abdominal troubles, blood purifier, malarial fever (works as Quinine)
iii) *Diyanku*		—	Tympanitis, hyper acidity, liver, troubles.

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iv) *Parpata* — Abdominal disorders, malaria fever, *pitta-vikar*.

v) *Taksya* — Throat and gastric cancer, blood purifier etc.

vi) *Payashava* — Throat and gastric cancer, healing of wounds.

vii *Pangchi* — Epilepsy

viii) *Solokarpo* — Mental and Heart troubles.

Mineral Drugs :

ix *Tuji* (*Doaws Chhola*) — 'Adharang'; Amavata and in gastric troubles.

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Fauna of Ladakh

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Ladakh, like its own flora, has its own fauna.

The following are a few of the animals :

1. Tibetan Antelope	(*Pantholops hodgsoni*)
2. Shapo	(*Ovis vignei*)
3. Gazella	(*Gazella procarpapicti-caudata*)
4. Wild Yak	(*Poephaqus crunnians*)
5. Ibex	(*Capra tibefica*)
6. Wild Ass	(*Equus kiang*)
7. Barial	
8. Snow Leopards	(*Uncia uncia*)
9. Ammion	
10. Lynx	(*Lynx Lynx-isabellina*)
11. Musk dear	(*Moschus moschiferus*)
12. Stone Marton	
13. Hax	
14. Fox	
15. Wooling cocus	
16. Snowpox	
17. Sand Gross and other river brids.	

Fishes in Ladakh have been reported up to 15,000' in the streams and rivers. But the Ladakhis do not catch or eat fish. Fish is called '*Nya*' in Ladakhi.

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Musk Deer :

The musk dear or the *Kasturi mriga* is a hornless deer. The male is armed with long upper turks projecting into three inches from the upper jaw and this discharges the function of a horn. It is golden or greyish brown in colour with black spots, white on the buttocks and under surfaces, but which variability locally: the coat is thick, the hair coarse, brittle, tubular, feathery light and very easily broken and will not withstand wear and tear, as such useless as a rug. The ears are very large and rounded at the tip. The tail is rudimentry, the external hoofs are very large. The male is distinguishable from female by canine teeth 2" long which is seen very plainly; he has a glandular pouch which secretes the musk from which the species takes its name.

Found all over the forest of Jammu and Kashmir provinces at the elevations of 8000' or more, they can be found any where they can browse, at any time of the year. Earlier it was said that they are not at all found in Ladakh region. But now they have been seen, though rare, at Suru zone of Kargil Forest Division. Near Sonamarg at Gund they are reported to be found in plenty.

Snakes are usually not found in Ladakh region. The party could also not see any snake during 3 months of stay in Ladakh region. However, the Range Officer of Nyoma told that snakes are found in Nyoma and Khalsi upto 4 ft. in length. He has personally seen the snakes.

A very interesting folk-lore collected is, that during winter snakes become senseless and live under the roof of stones. Snakes and a variety of Cat locally known as *Marmat*, usually leave their meals before the onset of winter (Snowfall) and become senseless. *Marmats* make caves and cover the mouth by grass and live inside during winter.

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Boars also adopt the same process, leave food before the on set of winter, become senseless and live in a protected place like under the roof of big stone.

They all become sensitive as soon as the snow is melted.

Livestock population information :

1.	Yalks	44,292
2.	Goats	1,83,128
3.	Sheep	17,578
4.	Horses	7,578
5.	Mules	179
6.	Donkeys	6,137
7.	Camels	18
8.	Poultry	8,508
9.	Bulls	1,453
10.	Calves	7,760
11.	Cows	14,263
12.	Zoo	4,632
13.	Zembo	3,269
14.	Tol	95
15.	Tolmo	148
16.	Gar	132
17.	Garmo	156

(By the Courtesy of Agriculture Department)

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Flora Of Ladakh

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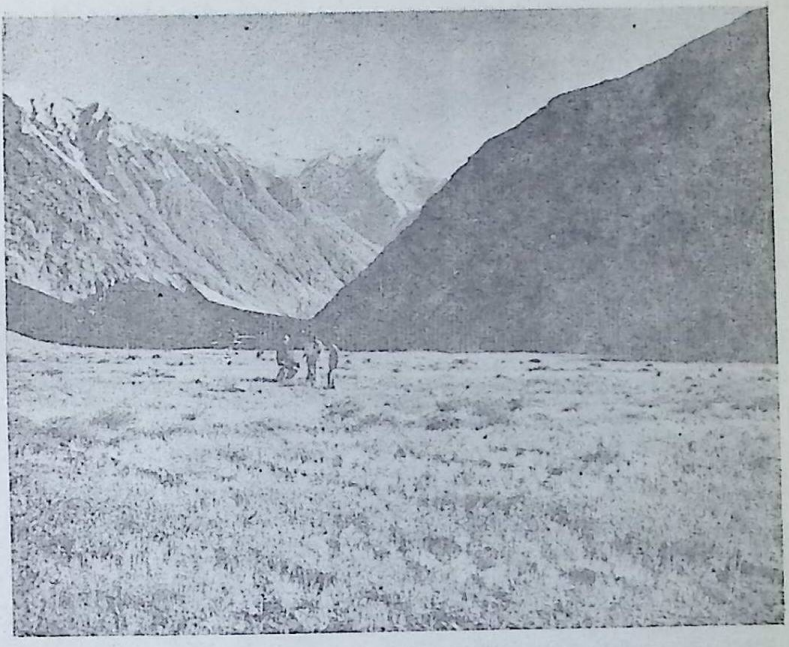

Party at work near Zozi-La

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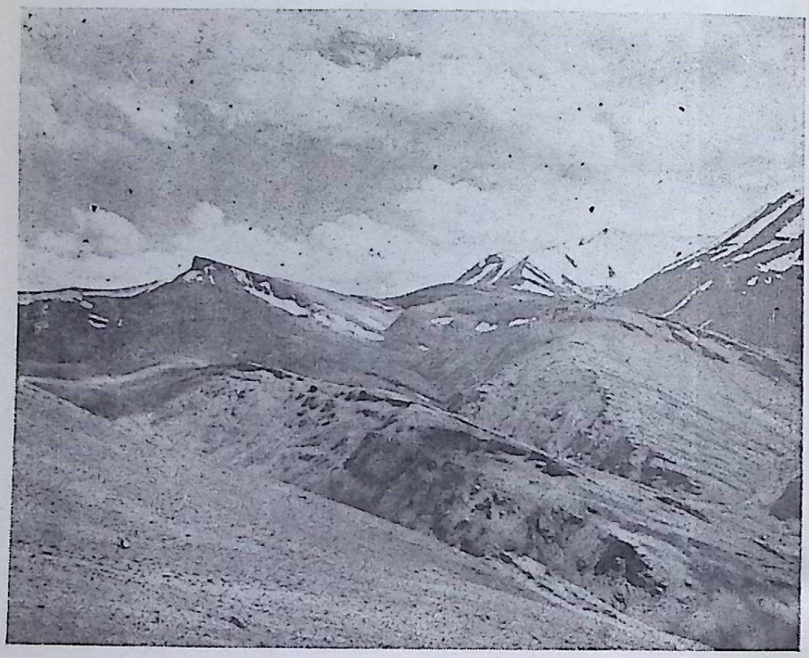

A view of the glacier at Bangle

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The preliminary survey was conducted in the following Forest Ranges and 1026 plant species (Field Book 3401 to 4427) were collected.

1. DRAS RANGE
2. KARGIL RANGE
3. LEH RANGE
4. CHUMATHAN RANGE
5. NUBRA RANGE

1. Dras Range :

In Dras range, the main area surveyed was the Dras Valley, and the places visited were : Zozi-La : Mina Marga ; Gumri ; Pan Dras, Matayan ; Oolbakhi ; Bembet ; Goshoon ; Gato ; Thakuran ; Lomchand etc.

Dras valley is an undulating valley of about 42 Kms. in length from east to west and about 10 Kms. in width from south to north with plants of pasteu-rages and cultivated fields It is surrounded by a ring of rugged peaks covered with snow. The valley is situated on either side of the river Dras which comes out from the glaciers of Zozi-La. The valley owes its peculiarity to the great depression in the Himalayas at the head of the Dras river, which allows constantly humid vepours of Kashmir to pass to north of the mountain, where they get condensed by cold and are precipitated by rain or snow.

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Valley of Dras is characterised by upper cretaceous deposits with basic and ultra basic rocks, a rare occurence in the Himalayan range. According to Gansser, this Indus Zone has the most important tectonic features of the whole Himalayas, and is mostly formed of Dras Volcanics.

Gansser further states, 'the Dras volcanics in the widest sense consist over 2000 m. of purple and green laminated siliceous ash beds and tufts with red charts or jasper alternating with slates, agglomeratic states and agglomerates'.

Wadia has mentioned, Quartzite, Slates, Fossiliferous lime stone (Cretaceous) tuffs, charts, horn blends granites and feldspar porphyries.

The soil of Dras valley is mainly moranic brought by the glaciers. The flat lands are under cultivation and the morainic hillocks are left for the growth of wild herbage, which are cut by the villagers before the setting in of winters, that is during September. The main flora of this region is *Prangos pabularis* Lindl. restricted from Pandras upto few miles a head of Dras. It is one of the most important herbage of this region. This plant is said to have nutritive properties and is supposed to cure rot in sheep. The other important common species are : *Ferula jaeschkeana* Vatke, *Astragalus* Sp., *Trigonella* Sp.; *Potentilla* Sp. etc.,

Scattered on either side of the road are *Hyoscyamus niger* Linn.; *Artemisia* Sp.; *Physochlaina praelata* Miers and few grasses.

As stated earlier, the valley of Dras commences from Zozi-La; on either side of Dras river are the snowy mountains. In the slopy meadows upto 12,000 ft. the floristic composition is of the alpine type with *Anemona* Sp.; *Gentiana* Sp.; *Pedicularis* Sp.; *Aconite* Sp.; *Primula* Sp.,

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etc. and higher up, *Rhododendron anthopogon* D. Don.; *Juniperus communis* Linn. ; *Picrorhiza kurroa* Royle. ex Benth. ; *Bergenia strachevi* (H&T.) Engle ; *Rheum* Sp. ; *Cotineaster* Sp.; *Ephedra geradiana* Wall. etc., were quite common.

The important medicinal plants which could be traded from this valley are : *Gentiana kurroa* Royle. ; *Ephedra gerardiana* Wall.; *Orchis latifolia* Linn.; *Hyoscyamus niger* Linn. ; *Physochliana prealata* Miers.; *Onosma* Sp.; and *Rheum* Sp.

2. **Kargil Range :**

In Kargil range, the main area visited was the Suru Valley and Bodhkharbu valley and the places visited were; Kargil, Panikhar, Sara, Sankhoo, Haradaspur, Mullbeck, Bodh-kharbu Istak Cha, Bodh-kharboo, forest and Namika-La.

Suru valley starts, with the head of the Suru river, which rises from the glaciers of Zaskar range of the Himalayas in the south-west and ends at Kargil. This zone gets more annual precipitation than the rest of Ladakh. The soil of the valley is black due to grey shale.

According to Gansser, 'this Zone, known as Kargil basin is famous for its well developed pliestocene terraces and their relation to the glacial history of the high Himalayan region. It is under lain by granites, which belong to the large Ladakh granite body north of the Indus river. The matrix is a red clay and higher up the conglomerates grade into arkoses and sand stones'.

Seeing the vegetation of this region, it may be called as the transition zone between Kashmir and Ladakh. A number of plants which are found in Kashmir are found in this region.

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Ex :—*Aconitum heterophyllum* Wall. ; *Podophyllum hexandrum* Royle. ; *Impatients* Sp. ; *Lotus corniculatus* Linn. ; The floristic features of this region is *Elscoltzia* Sp. ; *Artemisia* Sp. ; *Plantago* Sp. ; *Polygonum* Sp. ; and *Hyoscyamus pusillus* Linn. ; *Anaphalis* Sp. ; *Tenacetum* Sp. ; ete. Among the cultivated ones are *Salix* Sp. ; *Hippophae* Sp. ; *Tamarix* Sp. ; and *Poppulus* Sp.

Higher up, the plants which are common are *Gentiana kurroa ; Onosma* Sp. ; *Bergenia stracheyi ; Delphinium* Sp. ; and near the snow line are *Sedum* Sp. ; *Corydalis* Sp. etc.

The medicinal plants which could be traded from this valley in large quantity are : *Aconitum heterophyllum ; Podophyllum emodi ; Physochlaina praelata ; Macrotomia benthami ; Hyoscymus niger* and *Rheum* sp.

Valley of Bodh Kharbu is situated on either side of Dokpo rivulet which springs from the Fotula mountain and flows East-West to an elevation of 3300 m. The common plants are : *Corydalis* Sp. ; *Salvia* Sp. ; *Artemisia* Sp. *Physochlaina praelata* Miers. The important characteristic floristic structure of this valley is abundance of *Corydalis* Sp.

3. **Leh Range**:

In Leh range, the main area visited was Indus valley, and the important places visited were: Fotula, Lamayupu, Khalsi, Saspol, Nemu, Likir, Phiang, Taro, Sabu, Bangle, Khardung-La, Hemis, Karoo, Upshi, Shay, Thiksay and Leh etc.

This is the main region of Ladakhs ituated on either side of river Indus. The places like Khalsi, Likir Leh, Hemis etc.. lies in this valley. Geologically this vally is composed of Indus flysch and on the north, with Ladakh granite. The common plants of this valley are: *Iris ensata* Thunb; *Echinops*

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cornigerus DC.; *Peganum hermala* Linn.; *Tribulus terrestris* Linn.; *Astragalus* Sp.; *Medicago* Sp.; *Capparis spinosa* Linn.; *Thalictrum minus foetidum* (L.) Hook. d. s. Thom. S.; *Chenolea divericate* Hook. In this valley some time the vast patches of *Nepeta longibracteata* Benth.; and *Chenolea divericata* Hook. are often seen.

Higher up from Leh lies Khardung-La pass (6, 127 m) earlier known as Leh pass. The species commonly met are *Ephedra* sp.; *Nepeta discolor; Delphinium* Sp.; *Pedicularis sp*). *Astragalus* Sp.

Near Shay and Tiksay aquatic vegetation was also observed. Where the plants *Scripus* Sp. (*Demboo Kara*), *Polygonum* Sp., *Vallisanaria* Sp. *Utricularia* Sp ; *Hydrilla* Sp.; etc. were seen growing in abundanc.

The only medicinal plants which could be traded from this valley is *Ephedra gerardiana* Wall.

4. **Chumathan Range:**

In Chumathan range the main areas visited were: Pugga valley, Rushu valley, and the remaining part of the Indus valley. The important places visited were: Kairi, Nee, Skitiang, Chumathan, Neuma, Leuma, Tanglang-La, Tsokar lake, Jara, Kharnal etc.

Pugga Valley:

Pugga valley starts from Mahi bridge which is about 120 Kms. from Leh. This valley is about 40 Kms. long and about 15 Kms. wide lying in the north south direction upto Tsokar lake. The valley is almost without any vegetation and the rocks are of various colours, viz. red, black, and brown etc.

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The plant which is common by the side of the Pugga rivulet is *Myricaria* Sp.

This velley is famous for its spring and Sulphur and Borax minerals. As soon as one enters this valley from the Mahi bridge, the vapours of water, mixed with Sulphur are met throughout the way.

The upper portion of the Indus valley is full of silt and without any vegetation. The only vegetation which was observed was on the mountain ridges. The villages in this valley are situated only on the banks of the rivulets which shed their waters into the Indus.

These Nalas are full of vegetation. The plants found are: *Physochlaina paraelata Nepta* Sp.; *Chenopodium* Sp.; *Artemisia* Sp.; *Saussurea* Sp ; *Gentiana* Sp.; *Hipooche* Sp.; *Myricaria* Sp.; *Salix* Sp.; *Rheum* Sp.; *Astragalus* Sp.; and *Caragana* Sp.; *Ranunculus* Sp.; *Polygonum* Sp.; *Ephedra* Sp.; etc.

It was observed that *Poppulus* was not found growing in this region.

Chumathan village, which is situated by the Indus side, is the only village on the upper Indus valley. There is a hot spring in this village and Sulphur deposits are found by the side of this spring.

Rubesu Valley:

On east south of Leh about 110 Kms. is Tanglangla pass (5844m)., which may be called' the gate of way of the highest inhabited place in the world i. e. Rupshu. About 30 Kms. from Tanglang-La at the elevation of 5000 m. is Zara or Sang Dang Valley.

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Rupshu is the loftiest region of Ladakh with no depression less than 5000 m. and showline reaching upto 6334 m. According to Gansser, 'this region is dominated by large gneiss dome with metamorphics and granites out croppings'. Haiden was able to trace Triassic permian and Carboniferous sediments into the slaty and Phyllitic rocks on the southern boundry of Rupshu.

At the Head of this valley, which is about 2 Kms. wide and 16 Kms. long is Zara village. It is a temporary camp village with about 50-60 felt tents, situated by the side of the Zara river. The inhabitants are Chanapa a nomad goat-herds tribe. They keep yak and sheep.

At the end of the Sang valley there is bifurcation, one going towards Lahul Spiti in the South-West direction and other towards Tsokar lake in the north-east. From the place were bifurcation of the valley takes place is known as Yendra.

Tsokar lake (5167 m.) runs east to west about 10 Kms. long and 3 kms. wide. Now, this lake had dried to great extent. On the sides of this lake are deposit of common salt, Sodium Sulphate and Borax. The availabilty and chemical composition of the salts of this lake are studied.

All along this valley *Caragana pygmea* DC. is very conspicuous and adundant. In local lauguage *Caragana* Sp. is called as '*Arema* '.

The other plants which are found at the high altitude above 5334 m. are *Polygonum* Sp. of various colours, *Potentilla* Sp. *Tanacetum* Sp., *Nepeta longibracteata* Benth. *Sedum* Sp.; *Delphinium* Sp. *Gentiana* Sp. etc.

5. Numbra Range:

In Nubra range, the main area visited was Nubra valley, The important places lying in this velley are: Khardun: Koyak;

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Tirih; Sermmar; Teger, Penamick, Diskit, Hundar and Pratappur etc.

The Nubra valley lies in between Karakorum range in the north and Ladakh range in the south and is separated from central Ladakh by Khardung-La pass. The valley actually starts from village Khardung (4167 m.) and the villages are situated along the banks of the Shyok and Nubra river. The lower villages of this valley are as warm as the lower portion of the central Ladakh. While the upper villages enjoy a moderate climate, as compared with the higher villages of central Ladakh. Therefore, this valley is rich in vegetation.

The soil of Nubra valley is morainic and the flat lands are under cultivation with cereals, fruit, vegetable and timber crops.

The main shrubby flora of this valley is *Ephedra* Sp., *Ulmus* Sp., *Berberis* Sp., *Hippophae* Sp, *Myricaria* Sp., *Tamarix* Sp., and the cultivated ones are : *Morus* Sp., *Salix* Sp. and *Poppulus* Sp.

In the herbaceous plants the main are : *Clematis* Sp., *Allium* Sp., *Artemisia* Sp., *Aconitum* Sp., *Potentilla* Sp., *Gentiana* Sp., *Delphinuim* Sp., *Sedum* Sp., *Anemone* Sp. etc.

The main characteristic features in the flora of this valley is the presence of *Berberis ulcina Hook J. 9th* and *Ulmus parvifolia Jazq* as these plants are not found in any other location in Ladakh.

The only important medicinal plants which could be traded from this valley is *Ephedra gerardiana* Wall which was found growing in abundance in between Khardung and Koyak.

The important cultivated plants of this region are : Wheat, Barley, Brassica, Turnip, Raphinus, Cabbage etc. This region

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is very famous for the growth of fruit plants and the following plants were found growing in this region, Apricot, Apple, Walnut and even Grapes.

This valley is famous for its water springs and soda fields. One spring is quite near to Panamick while other a few kms. enroute to Daulatbag oulde.

Soda bicarb (Soda) is quite common here and white deposits, are commonly seen. Soda can be extracted in large quantities from this place. People of this place extract soda and sell at Leh @ Rs. 20/- per maund or exchange 1 Kg. of soda for 2 Kg. *Gandum.*

About 2 kms away from Panamick there is a field of Sodium Carbonate locally known as *Khara soda* and people of this place use in washing clothes.

The field from where soda is extracted are known as *Pullithan.* Soda bicarb locally known as *Meetha Soda* and is used in preparation of tea. During winter the deposition of soda on the surface is increased and sometimes even reaches above 1 ft. high. A number of samples from different spots, of sodium bicarbonate and sodium carbonate were collected. The entire demand of Ladakh for Sodium bicarbonate and Sodium Carbonate is met by this area.

There is one hot water spring which is located at the base of a hill slope near the soda field, which is said to be very good for stomach diseases. *Amchies* of Diskit come with patients to this place. They ask the patients to drink the water up to their full capacity and then make them to run upto the nearby hillock. After. some time, that patient vomits. This process is repeated several times, at an interval, of few days, according to the degree of the diseases. After this the *Amchi* prescribes few herbal medicines to the patients.

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A list of plants collected is as hereunder :-

	Field No (s).
I. Asclepiadaceae	
Cynanchum acutum Linn.	3774, 4325
Cynanchum glaucum Wall.	3914, 4060
II. Balsaminaceae	
Impatiens brachycentra Kar. & Kir.	3733
Impatiens gigantea Edgew.	3750
Impatiens roylei Walp.	3412
III. Berberidaceae	
Berberis vulgaris Linn.	4423
Berberis ulicina Hk.f. & T.	4340
Podophyllum hexandrum Wall.	3832
=*P. emodi* Wall.	3656
IV. Boraginaceae	
Actinocarya tibetica Benth.	4132
Anchusa ovata Lehm.	
=*Lycopsis arvensis* Linn. ssp. *orientalis* O. Kuntze.	4084 3940
Arnebia euchroma (Royle) I. M. Johnston	3859
=*M. euchroma* (Royle) Panls.	3555
=*M. perennis* (Schr.) Boiss.	3806
Arnebia tibetiana Kurz.	3958, 4089, 4291

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Asperugo procumbens Linn. 3454

Cynoglossum micranthum Desf.
=*C. lanceolatum* Forsk. 3412

Cyrioglossum glochidiatum Wall. ex. Bth.
=*C. denticulatum* A. DC. 3613

=*C. wallichi* G. Don. 3543

Lappula barbata (M. Bieb) Giirke 3937

Lappula microcarpa (Ledeb.) Giirke 3490, 3531, 3757

Lindelofia longifolia (Bth.) Bendl. var.
falconeri (Cl.) Brand.
=*L. spectabilis* Lehm. 3429, 3508, 3685

Lycopsis arvensis Linn. 3531, 3692, 3693

Macrotomia perennis Boiss. 3651

Microula sikkimensis 4173

Microula tibetica Maxim.
=*M. benthamii* C. B. Cl. 4121

Onosma hispidium Wall. ex. D. Don. 3650

Paracaryum asperum Stocks 3929

Pseudom retensia echioides (Benth.) Reidl.
=*Martensia echioides* (Benth.) & Hook. 3536

Solenanthus circinnatus Ledeb. 3530

V. Campanulaceae

Campanula areyotricha Wall. ex. DC. 3676, 4053

Campanula aristata Wall. ex. Roxb. 4205

Campanula tibetica Hk. f. & T. 3445

Codonopsis ovata Benth. 3548, 3836

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VI Capparidaceae

Capparis spinosa Linn. 3957, 4087

VII. Caprifoliaceae

Lonicera asperifolia (Dene.) Hk. F. & T. 3704

Lonicera hypoleuca Dene. 3791

Lonicera parviflara Edgew 3951, 3986

Lonicera semerovi Regel. 4272

=*L. spinosa* Jacq. 4022

Sambucus edulus Linn. 4415

VIII. Caryophyllaceae

Arenaria perlevis (William) Hand.—Mazz. 4356

Cerastium cerastoides (L.) Britt. 3998, 4249, 4262
=*C. trigynum* Villars.

Cerastium glomeratum Thuill. 3424, 3479

Dianthus angulatus Royle 3684, 3717

Leyproidiclis holosteoides Fenzl ex Fisch & Mey
=*Arenaria holosteoides* Edgew
=*Cerastium holosteoides* Fries. 3639, 3853

Minuartia kashmirica (Edgew) Mattfdd 3432, 3485, 3554

Minuartia lineata (C.A.Mey) Zornm.
=*Arenaris foliosa* Royle ex Hk.f. & Edgew 3955

Silene gonosperma (Rohrb.) Bocquet.
Sp. himalayensis (Rohrb.) Bocquet.
Var. himalayenses. 3970

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Silene himalayensis (Edgew.) Mej
=*Lychnis himalayensis* Edgew. 3682

Silene conoidea Linn. 3447

Silene persica Boiss. Sub. sp.
moorcroftiana (Roxb.) Chaudhri
=*S. moorcroftiana* Rehrb. 3935, 4033

Silene tenuis Willd. 3519

Silene vulgaris (Moench.) Garcke 3409

Stellaria alsine Grimm.
=*S. uliginosa* Murr. (non Linn.) 4187

Stellaria crispata Wall. ex.D.Don. 3834

Stellaria decumbens Edgew. 3656, 3935

Stellaria longissima Wall. 4111

Stellaria media Linn. 4337

Stellaria semivestita Edgew. 3562

Vaccaria pyramidata Medic.
=*Saponaria vaccaria* Linn. 4157

IX. Cruciferal

Alyssum canescens DC. 4345

Arabidopsis mollissima (C.A.Mey) Sch. 3455, 3487

Arabis recta Vill.
=*A. auriculata* Sensu DC. non Linn. 4026

Arabis tibetica Hk. & Th. 3686, 4360

Brassica campestris Linn.
Var. Sarson 3437

Capsella bursa-pastoris (Linn.) Moench. 3423, 4170, 4028

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Christolea crassi folia Camb.	3919, 4237, 4342
Conringia planisiligua F & M.	4156
Descurainea sophia (L) Webs.	4361
Dontostemon glandulosus (Kar. & Kir.) Schutz. =*Arabis glandulosa* Kar & Kir.	4213
Draba glacielus Adams.	3808
Draba lasiyophylla Royle	4268
Draba oreades Schr.	3807, 3868, 3980, 4267
Elucidium talaricum DC	3465
Eruca sativa Mill.	4362
Euclidium syriacum R.Br.	3623
Lepiduim capitatum Hk.f. & Th.	4102
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Var. *depressa* (Hk. f.) Lipschitz.

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=*S. sorocephala anct.* nor Schr. 4242

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Ephedra gerardiana Wall.

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Anemone wallichiana Royle 3871

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=*R. aquatilis* L. Var. *sphaerospermus* Boiss 4139

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Aconitum heterophyllum Wall.
A common plant at Suru

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Podophyllum hexandrum Wall.
A medicinal herb in original habitat

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Ranunculus pulchellus C. A. Mey. 3471, 4133, 4192

Thalictoum alpinum Linn. 4265

Thalictrum elegans Wall. 4041

Thalictrum javanicum Bl. 3907

Thalictrum foliosum DC. 4161

Thalicutrum minus Linn.

Var. *foetidum* (L) Hk. f. & Th. 4081

Thalictrum minus Var. *majus* 3538, 3678

Trollis acaulis Linn. 3643

L. Rosaceae

Cotoneaster duthieanus Klotz. 3703

Cotoneaster integerrima Medik.

=*C. vulgaris* Lindl. 3790, 3897

Potentilla anserina Linn. 3439, 4346

Potentilla argyrophylla

Var. *leucochroa* Hk. f. 3975

Potentilla arpuscula D. Don.

Var. *pumila* (Hk.f.) Hand.-Ma. 4238

Potentilla bifurca Linn. 3474, 4172, 4194

Potentilla gelida C. A. Mey. 3596, 4241

Potentilla multifida Linn. 3441, 3552, 3730, 4364

Potentilla nivea Linn. 4246

Potentilla reptans Linn. 3978

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Potentilla sibaldi Hall f, 3646

Prunus armeniaca Linn. 4164

Rosa foetida Hessrn.

=*R. lutea* Mill. 3502

Rosa sericea Lindle. 4335.

Rosa webbiana Wall. ex. Royle. 3503, 4167

Sibbaldia parviflora Willd. 3976

Sibbaldia purpurea Royle.

=*P. purpurea* Royle 4252

Spiraea sp. 4338

LI. Rubiaceae

Galium aparine Linn. 3405, 3667, 4166

Galium boneale Linn. 3435, 3505

Galium verum Linn. 3559

LII Salicaceae

Populus balsamifera Linn. 3911

Populus candicans Ait. 3482

Salix sp. 3780

Salix angustifolia Willd. 4319

Salix flabbellaris Anderss. 3647

Salix oxycarpa Andress. 3483, 4179

LIII. Saxifragceae

Bergenia stracheyii (Hk. f. & Thom.) Engl. 3564, 3860

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Parnassia ovata Ledeb. 3627, 3727

Ribes orientalis Desf. 3719

Ribes emodense Rehd. 3857

Saxifraga flagellaris Willd. 3585

Saxifraga flagellaris Willd. Ex. Sterns
ssp. *stenophylla* (Royle) Hulton 3585, 3966
4257

Saxifraga flagellaris Willd.
sub. ssp. *euflagellaris* Engl. et Ironsch
Var. *stenosepta* Trantv. 3641

Saxifraga mitens H f. & T. 4276

LIV Scrophulariaceae

Euphrasia densiflora Pennell. 4286

Euphrasia flabellata Pennell. 3821

Euphrasia schlagintweitii Weltst. 3473

Lancea tibetica Hk. f. & Thoms. 3909, 4030
4186

Pedicularis cheilanthifolia Schrenk 4048

Pedicularis longiflora
ssp. *tubiformis* (Klotz.) Pennell. 3910

Pedicularis oederi Vahl. 3568

Pedicularis pectinata Wall. ex. Benth.
ssp. *bipinnatifida* Bern. 3421, 3494
3844

Pedicularis purpurea Pennell. 4203, 4273

Picrorhiza kurroa Benth. 3565

Verbascum thapsus Linn. 3436

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Veronica beccabunga Linn. 3465

Veronica biloba Linn. 3427, 3811, 4181

Veronica ciliata Fesch. 4182

Veronica salina Schr. 3742, 4363

LV Solanaceae

Hyoscyamus niger Linn. 3444, 3658

Hyoscyamus pusillus Linn. 3766

Lycium ruthenium Murray. 4316

Solanum nigrum Linn. 4430

Physochlaina praealta Miers. 3545, 3767

LVI. Tamaricaceae

Myricaria elegans Royle. 3890

Myricaria germanica (L) Desv. 3814, 3921, 4320, 4321, 4330

LVII. Umbelliferae

Angelica archangelica

Var. *himalica* (Cl) Krishana & Bhad. 3588

Bunium persicum (Boiss.) Fdts.

=*Carum bulbocastanum* Sensnel 3529, 3546

Bupleurum clarkianum (Wolff) Nasir 3417

Bupleurum gracillimum Kl.

=*B. falcatum* L.var. *nigrocarpa* Jacq. ex. CB. clarke 3716, 3960

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Carum carvi Linn. 3615, 3818, 3945, 4013

Chaerophyllum reflexum Lindl. 3414, 3408 3830

Chaerophyllum villosum Wall. ex. DC. 3788

Heracleum candicans Wall. 3506

Heracleum lanatum Mickx. 4085

Heracleum pinnatum C.B.Cl. 3887

Heracleum thomsoni C.B. Clarke 3714, 3849, 4184

Heracleum vulgatum Koch. 3547

Prangos pabularia Lindl. 3420

Pleurospermum hookeri C.B.Cl. 4201

Sium latijugum C.Bc. 3499

Trachedium obtusiusculum Clarke. 3707

Torilis japonica (Houtt.) DC.
=*Caucalis anthriscus* (L) Huds. 3777

Vicatia coniifolia DC. 3637, 4202

Vicatia wolfiiana (Waft-ex; Fedde) Norman. 4183

LVIII Urticaceae

Parietaria debilis G. Forst. 4336

Urtica dioica Linn. 3896

LIX. Valerianaceae

Urtica hyperborea Jacq. ex. Wedd. 4227

Valeriana dioica Linn. 3525

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Valeriana wallichii DC. 3587

LX. Zygophyliaceae

Peganum harmala Linn. 3917

Tribulus terrestris Linn. 3776, 4366

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Preliminary Chemical Analysis of Certain Collected Specimens

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44 different samples of plants were collected from different localities or Ladakh for conducting chemical, studies. Most of these plants are used in Indigenous system of medicines (called *Amchi* system) for the treatment of various ailments. These different samples were subjected for preliminary chemical analysis for the presence of alkaloids coumarins, steroids and terpenoids, flavonoids and phenols, 12 of these plants have also been studied for their essential oil contents. Details of the plants identified and the results of their chemical studies are as given below. Out of 44 plants screened for various constituents, 23 plants had alkaloids, 18 coumarins, 20 steroids, 26 phenols and 11 flavonoids.

Sample No.

3405 *Gallium* Sp. : (*Rubiaceae*), an erect herb w ith white flowers, found on marshy places, collected from Doshun (Drass) at the height of 11,000 ft., Commonly available.

Uses : The expressed juice of the plant is used as diuretic, aperient and antiscorbutic. Local *Amchies* use the plant for the treatment of epilepsy and hysteria.

3416 *Achillea millefolium* Linn. (*Compositae*), herb with white flowers, found on moist places, collected from Drass at the height of 10,500 ft., commonly available. The plant is locally known as *Khambu.*

Uses : The plant is used in bad cold and fever. It is also used as a tonic and stimulant and as an insectisidal for the tree diseases.

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Sample No.

3420 *Prangos pabularia* Lindl (*Umbellifereae*), a under shrub with yellow flowers, on dry slopes, collected from Drass at the height of 10,500 ft., locally known as *Plany* and used as fodder by local inhabitants.

Uses : The roots of the plant are used in diarrhoea, itching, as a diuretic and given to the cows for increasing milk. The fruits are used in stomachic and also as carminative, stimulent and diuretic.

3444 *Hyoscyamus niger* Linn. (*Solanaceae*), a herb with purplish lurid green flowers, found along the road sides of Drass at the height of 10,030 ft,, locally known as *Phagun*, frequently available.

Uses : The leaves of the plant are used in asthma and whooping cough.

3466 *Artemisa absinthium* Linn. (*Compositae*), an aromatic herb found on dry places, collected from Drass at the height of 10,500 ft., commonly available. The plant is locally known as *Burse* or *Vurche.*

Uses : The flowers of the plant are used as vermifuge.

3499 *Plantago major* Linn. (*Plantaginaceae*), herb found on moist places, collected from Drass at the height of 10,500 ft., frequently available. The plants is locally known as *Tharam.*

Uses : Seeds are used in gastric complaints, burniag sensation in stomach and dysentry. Leaves are applied to bruises.

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Sample No.

3501 *Thymus serphyllum* Linn. (*Labiatae*), a prostrate herb, aromatic, collected from Drass at the height of 10,000 ft., commonly available. The plant is locally known as *Tumbra* and *Tumba*.

Uses : Local *Amchies* use the plant in abdominal pain, liver troubles and as an anthelmentic. It is also prescribed in certain skin diseases. The oil is used in toothache.

3513 *Ephedra gerardiana* Wall. (*Ephedraceae*), an under shrub with yellow flowers, found on dry slopy and rocky places, collected from Goshun (Drass) at the height of 12,000 ft., frequently available. The plant is locally known as *Thayon*.

Uses : The extract of the leaves are used in respiratory diseases. The roots and stems are given in Rheumatism. Local *Amchies* use it in liver and blood diseases. Wood of the plant is used for cleaning teeth by local people.

3521 *Euphorbia thomsoniana* Boiss, (*Euphorbiaceae*), a perennial herb, collected from Drass at the height of 11,000 ft., frequently available. It is locally known as *Tharnu*.

Uses : It is used as purgative and its latex is applied in certain skin diseases.

3522 *Euphorbia tibetica* Boiss, (*Euphorbiaceae*), a herb with yellow flowers, found on dry rocky soils, collected from Drass at the height of 11,500 ft., frequently available

Uses : The plant is locally known as *Hrivi* and *Tharnu*. Local *Amchies* use its latax and roots as purgative.

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Sample No.

3546 *Bunium persicum* (Boiss.) Fdts.,

=*Carum bulbocastanum* Koch. (*Umbelliferae*), a herb with white flowers, on rocky slopes, collected from Ulbakhlom (Drass) at the height of 11,000 ft., commonly available. It is locally known as *Thayon.*

Uses : The fruits are used as carminative and in stomachic.

3565 Picrorhiza *kurroa* Bench. (*Scrophulariaceae*), a herb whith light blue flowers, found on moist places collected from Gummri at the height of 13,000 ft, frequently available. The plant is locally known as *Hauglang.*

Uses : The roots are used in fever, stomachic and dyspepsia.

3588 *Angelica archangelica* var, *himatica* (Cl.) Krishna & Bhad., (*Umbelliferae*), an erect herb with yellowish white flowers, found on moist places, collected from Drass at the height of 10,500 ft., frequently available.

Uses : The fruits and roots of the plant are used as stimulant, expectorant and diaphoretic.

3599 *Juniperus communis* Linn, (*Cupressaceae*), a spreading shurb with yellowish flowers, found on rocky places, collected from Gumari (Drass) at the height of 13,000 ft., commonly available. It is locally known as *Sukapa.*

Uses : Berries are used as diuretic, carminative and stimulant. They are also used in curing some skin

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Sample No.

diseases. *Amchies* use the leaves of the plant as incense.

3678 *Thalictrum minus* var. *majus* Linn., (*Ranunculaceae*), a herb on moist places, collected from Drass at the height of 10,700 ft., commonly available as a weed. It is locally known as *Chaugrsmochaskue*.

Uses : Leaves and roots are used in feaver. Local *Amchies* use in conjunctivitis.

3720 *Perovskia abrotanoides* Karel. (*Labiatae*), a shurb with blue flowers, found on dry slopes, collected from kargil at the height of 8,000 ft. frequently available.

Uses : The plant is applied externally as a cooling medicine in fever.

3767 *Physochlaina praealta* Miers. (*Solanaceae*), an erect nearly glabrous herb, found on dry slopy places, collected from Hardass (Kargil) at the height of 8,000 ft., frequently available. It is locally known as *Langtan*.

3675 *Chenopodium botrys* Linn. (*Chenopodiaceae*), an aromatic herb, found on dry sandy places, collected from Hardass at the height of 8,000 ft., commonly available. The plant is locally known as *Nigu*, *Hama*.

Uses : Local *Amchies* use the plant in stomach and liver diseases. It is also used as an anthelmintic, diuretic and laxative.

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Sample No.

3796 *Tribulus terrestris* Linn. (*Zygophyllaceae*), a prostrate herb with yellow flowers, found on dry sandy places, collected from Hardass at the height of 8,000 ft., commonly available. locally known as *Jema*.

Uses : Fruits are used in the treatment of gout, kindney diseases and pain, also used as diuretic, tonic and aphrodisiac. Local *Amchies* claim this plant to possess antifertility properties.

3804 *Rheum webbiana* Royle. (*Polygonaceae*), a herb with violet flowers, found on moist places, collected from Suru (Kargil) at the height of 10,000 ft., frequently available. It is locally known as *Lachu* and *Chucha*.

Uses : Local *Amchies* use its roots in abdominal diseases and its paste on wounds. It is also used as a purgative and astringent. Tender leaves of the plant are used as vegetable by the local inhabitants. They make garland of its leaves and keep in for drying.

3813 *Aconitum heterophyllum* Wall. ex Royle. (*Ranunculaceae*) a herb with bright blue, greenish blue with purple veins, collected from Suru (Kargil) at the height of 9,000 ft., found on moist places. The plant is locally known as *Buans Ponkar*

Uses : *Amchies* use its root in abdominal diseases, diarrhoea, fever and cough.

3832 *Podophyllum hexandrum* Wall =*P. emodi* Wall.

(*Berberidaceae*), a herb on moist places, collected from Suru (Kargil) at the height of 10, 000 ft.,

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Sample No.

commonly available. It is locally known as *Dremmuksu.*

Uses : Decoction of the roots is used in diarrhoea and liver troubles.

3848 *Aconnitum heterophyllum* Wall. (*Ranunculaceae*), a herb with blue flowers, found on moist places, collected from Suru (Kargil) at the height of 10,000 ft., frequently available. The plant is locally known as *Buans Ponkar.*

Uses : The roots of the plant are used by local *Amchies* in the treatment of abdominal diseases, diarrhoea, fever and cough.

3860 *Bergenia stracheyii* (Hk.f. & Thom.) Engl. (*Saxifragaceae*), a herb found on moist rocky places, collected from Budhkharboo at the height of 12,000 ft., commonly available.

Uses : It is used by local *Amchies* in the treatment of Kidney stones.

3867 *Allium carolnionum* DC. (*Liliaceae*), a herb on marshy places, collected from Budhkharboo at the height of 12,000 ft., commonly available. The plant is locally known as *Skiche.*

Uses : The whole plant is aromatic and given with milk to women after delivery. It is useful in constipation.

3870 *Artemisia maritima* Linn. (*Compositae*), an aromatic herb found on dry places, collected from Budhkharboo at the height of 12, 000 ft., com-

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Sample No.

monly available. It is locally known as *Khamba*, *Phunkar*.

Uses : Local people use this plant in gastric diseases and "*Aphara*" in animals. It is used as an antiseptic and vermifuge in the form of powder and also used as haemostatic on wounds and cuts.

3872 *Tanacetum senecionis* J. Gay. (*Compositae*), a herb found on slopy places, collected from Budhkharboo at the height of 11, 000 ft., frequently available. The plant is locally known as *Purnak*, *Khankar*.

Uses : Local *Amchies* use it in colic and ear diseases.

2876 *Artemisia desertorum* Spreng. (*Compositae*) a herb found on dry slopy places, collected from Budhkharboo at the height of 12,000 ft., commonly available.

Uses : The plant is used as an antiseptic and vermifuge.

3887 *Heracleum pinnatum* C. B. Cl. (*Umbelliferae*), a under shrub found along road sides, collected from Kharboo at the height of 8,000 ft., abundantly available. The plant is locally known as *Sanphero*.

Uses : The roots are used in leucoderma by *Amchies*. The shoots of the plant are used as fodder by local inhabitants.

3913 *Corydalis flabellata* Edgew. (*Fumariaceae*), a herb with yellow flowers found on slopy places,

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Sample No.

collected from Budhkharboo at the height of 11,000 ft., abundantly available. The plant is locally known as *Tongil*, *Gyatukmasuerapo*.

Uses : The plant is used as fish poison. It is also used in fever by *Amchies*.

3915 *Nepeta floccosa* Benth. (*Labiatae*), a herb with violet flowers, sweet smelling, on dry slopes, collected from Budhkharboo and Khardung at the height of 13,000 ft., and 11,000 ft., respectively, frequently available. It is locally known as *Jipchi*, *Skiling*.

Uses : The plant is used as a carminative, tonic and in eye diseases. Its stems and roots are used by local people for the ripening and preservation of apricots.

4002 *Centaurea picris* Pall. (*Compositae*), a herb with pink flowers, found on moist places, collected from Leh at the height of 11,500 ft., frequently available, leaves very bitter.

Uses : It is locally known as *Vasak* and used in *Amchi* system of medicine for lowering the fever.

4014 *Inula racemosa* Hook. (*Compositae*), a herb with yellow flowers found on moist places, collected from Leh at the height of 11, 500 ft., frequently available. The plant is locally known as *Pushkermoola*, *Manu*.

Uses :Roots of the plant are used in gastric disorder and rheumatism by *Amchies*.

4060 *Cynanchum glaucum* Wall. (*Asclepiadaceae*), a herb found on rocky slopes, collected from Hemis

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Sample No.

(Leh) at the height of 11,000ft., It is locally known as *Tung-Me-Yung*.

Uses : The plant is used in dysentry with combination of other drugs.

4110 *Dracocephalum heterophyllum* Benth. (*Labiatae*), a herb with white flowers, found on moist places of cultivated fields, collected from Skitmang at the height of 13, 200ft., The plant is locally known as *Zinthick*.

Uses : The plant is used in eye diseases.

4115. *Halogeton glomerants* (M. Biek) C. A. Mey.; *Chenopodiaceae*), a prostrate herb found on moist places, collected from Chumathang at the height of 13,400 ft., frequently available. The plant is locally known as *Chhars*.

4121 *Microula tibetica* Maxim. (*Boraginaceae*), a herb with small white flowers, found on moist places (usually as a weed), collected from Chumathang at the height of 13, 400 ft., frequently available. The plant is locally known as *Charoknenma*.

Uses: The plant is used in cough and in various lung diseases with combination of other drugs.

4147 *Nepeta coerulescens* Maxim., (*Labiatae*), a herb with blue flowers, found on moist places, collected from Chumathang at the height of 13,400 ft.; commonly available. It is locally known as *Kohra*.

Uses : The plant is used in certain eye diseases by local *Amchies*.

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Sample No.

4161 *Thalictrum foliosum* DC. (*Ranunculaceae*), a herb found on moist places along the bunds of nallah. collected from Nee (Chumathang) at the height of 13,000 ft., commonly available. It is locally known as *Chakku*.

Uses: Local *Amchies* use the plant in the treatment of rheumatism and gout.

4230 *Chrysanthemum richteria* Bth. ex, Clarke., (*Compositae*), a herb with pink flowers fading to white, collected from Bangle at the height of 15,600 ft., frequently available.

4232 *Tanacetum tibeticum* Hk. f. Thomos., (*Compositae*), a herb with bright yellow flowers, sweet smelling, found on dry slopy places, collected from Bangle at the height of 15,600 ft., commonly available. The plant is locally known as *Khurmo*.

Uses: Dry leaves are locally used as *Dhoop* for worshiping.

4233 *Biebersteinia emodii* Jaub and Spach. (*Geraniaceae*), a herb with yellow flowers having foetid smell, found on dry slopy places, collected from Bangle at the height of 15,600 ft,. commonly available.

4237 *Waldhemia glabra* Regel., (*Compositae*), a prostrate herb with pink flowers, found on dry places, collected from Gneem (Bangle) at the height of 17, 500 ft., commonly available. It is locally known as *Pulloonakpo*.

Uses: Dry plant is used as *Dhoop* for worship.

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Sample No.

4283 *Elscholtzia densa* Bth., (*Labiatae*), a herb with blue flowers, collected from Khardung at the height of 14, 000 ft., commonly available as a crop weed.

Preliminery Chemical Studies

S. No.	Sample Nos.	Alkaloids	Coumarins	Steroids & Terpenoids	Phenols	Flavonoids
1	3405	+	+	−	−	−
2	3416	+	+	−	×	−
3	3420	+	+	−	+	−
4	3444	+	−	−	+	−
5	3466	−	−	−	−	−
6	3499	−	−	−	−	−
7	3501	−	−	+	+	−
8	3513	+	−	−	−	−
9	3521	−	+	+	−	−
10	3522	+	+	+	−	+
11	3546	−	−	+	+	−
12	3565	−	−	+	+	−
13	3588	−	−	−	+	+
14	3599	−	+	+	+	−
15	3678	+	+	+	−	−
16	3720	+	+	−	+	−
17	3767	+	−	+	−	+
18	3775	−	−	−	+	−
19	3776	+	+	−	+	+

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S. No.	Sample Nos.	Alkaloids	Coumarins	Steroids & Terpenoids	Phenols	Flavonoids
20	3804	+	−	+	+	−
21	3813	+	−	+	−	−
22	3832	−	−	+	+	−
23	3847	+	−	+	−	−
24	3860	+	+	+	−	+
25	3868	+	−	−	+	−
26	3870	−	+	−	+	+
27	3872	−	+	+	+	−
28	3876	−	+	−	−	+
29	3887	+	+	−	−	+
30	3913	+	−	−	−	−
31	3915	+	+	+	+	−
32	4002	−	+	+	−	−
33	4014	−	−	+	+	−
34	4060	+	−	−	−	−
35	4110	−	+	−	+	−
36	4115	−	−	+	+	+
37	4121	−	−	−	−	+
38	4147	−	−	−	+	−
39	4161	+	−	−	+	−
40	4230	−	−	−	−	−
41	4232	−	−	+	+	−
42	4233	+	−	+	+	+
43	4247	+	−	+	−	−
44	4283	−	−	−	+	−

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Essential Oil Contents Of Aromatic Plants

S. No.	Sample No.	Essential Oil Percentage
1	3420	1.2%
2	3446	3.8%
3	3588	0.1%
4	3720	0.1%
5	3775	0.01%
6	3876	traces
7	4110	traces
8	4147	0.1%
9	4230	traces
10	4232	0.2%
11	4237	0.2%
12	4283 4293	0.2%

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Other Collected Material

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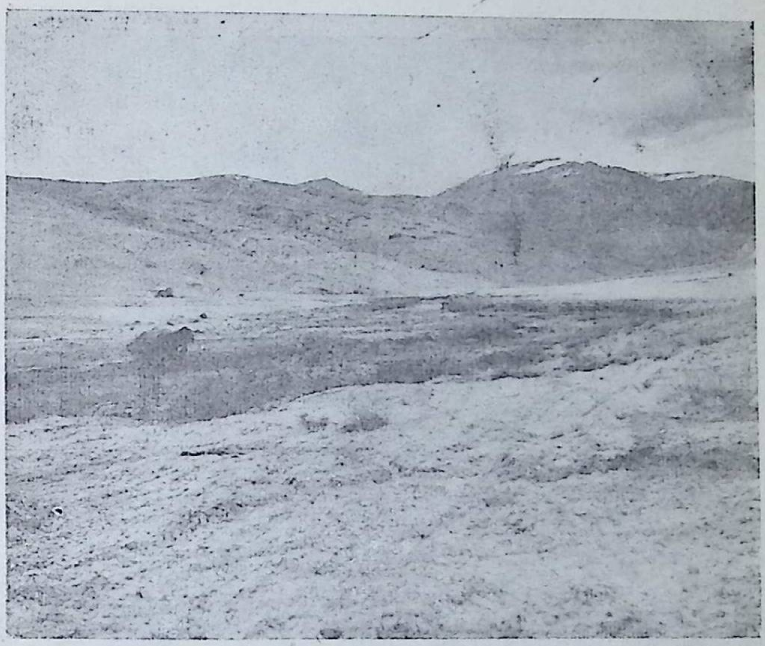

Deposits of Borax at Pugga Valley

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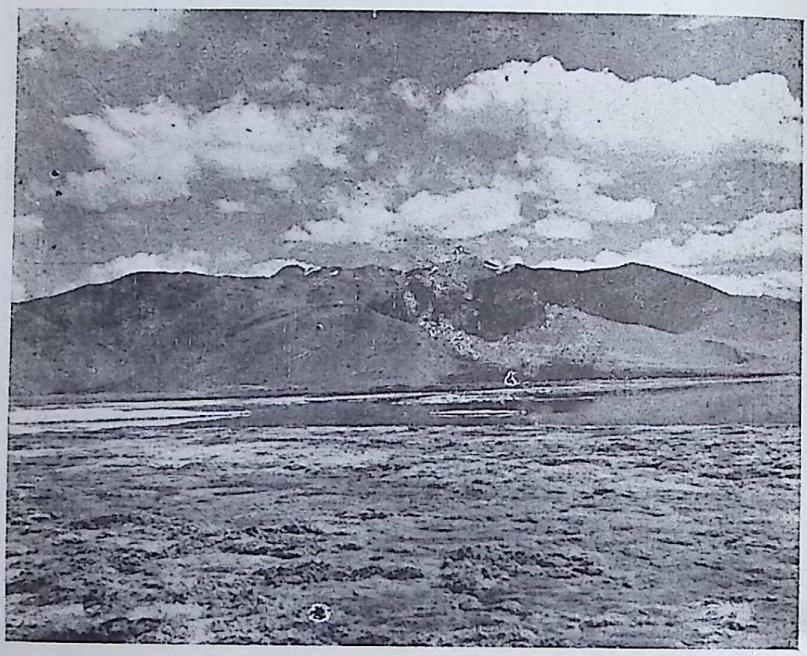

Desposits of Sodium
Sulphate at Tsokar Lake

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The following mineral material was collected :

	Name	Area
1.	Borax	(Pugga)
2.	Sulphur	(Pugga)
3.	Soda bicarb	(Panamick)
4.	Sodium Carbonate	(Panamick)
5.	Sodium Sulphate, Potash etc.	(Tsokar lake)
6.	Serpine (*Jaharmohra*)	(Dras)
7.	Quartz	(Dras)
8.	Sand Samples near Indus River for investigation of gold etc.	(Panamick)
9.	Water Samples	(Pugga)
10.	Natural *Shilajeet*	(Bodh Kharbu, Kargil)
11.	Market Samples of *Shilajeet*	(Leh, Kargil)
12.	Stones with Chromide Deposit	(Dras)
13.	Lime Stone	(Dras)
14.	Silicales	(Dras)
15.	Stones with metal deposit.	

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Trade Prospects and Economics

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The pilot survey revealed that valleys and hills of Ladakh have some important medicinal plants which are being imported to the tune of several lakhs either as the plants as a whole or as the active constituents from foreign countries.

Ephedra :

This plant grows in abundance throughout the vast region of Ladakh. This plant is used as fuel by Ladakh without realising its importance as drug. Approximately, 5000 Quintals of the plant is annually burnt.

Presently the country imports the active constituents like; Ephedrine hydrochloride and Ephedrine alkaloids as mentioned below, which is extracted from Ephedra.

	1970 Rs.	1971 Rs.	1972 Rs.	1973 Rs.	1974 Rs.	1975 Rs.
Ephedrine Hydrochloride	16,94,725	42,37,439	21,44,596	8,27,670	13,12,771	32,52,150
Ephedrine Alkaloid	1,10,807	1,91,474	16,008	24,128	20,201	1,87,982

The possibility of planned extraction of the drug is worthy of consideration. As the transportation of bulk crude drug would be a costly affair therefore, the extraction equipments may be installed in the field, as pilot units, and active consti-

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tuents be extracted, at site. The plant residue, which is a woody portion, after drying could however, be utilised as a fuel.

B) Physochlaina and Hyoscyamus :

These two plants are also quite plentiful, all over this region particularly, in waste lands near the fields and under the boulders. The Ladakhi people, every year cut these plants, at the time of herbage collection. But, due to the poisonous nature of the plants they throw them as waste. This way, this, drug is wasted in tons of quantity every year.

Presently, the country imports the alkaloid salts viz. Atropine Sulphate and Belladonna leaves and roots as indicated below :

	1970 Rs.	1971 Rs.	1972 Rs.	1973 Rs.	1974 Rs.	1975 Rs.
Atropine Sulphate.	1,21,153	1,00,494	66,016	1,27,413	1,14,687	1,89,015
Belladonna Leaves and Roots.	20,716	51,780	—	89,074	22,003	17 944

These Two plants viz. *Physachlaina* and *Hyoscyamus* can form an excellant source for the indigenous manufacture of Atrophine Sulphate. It is estimated, that about 45-50 tons of raw drug could casily be made available from the wild sources. To Make the steady supply of the drug the inhabitants can be encouraged to cultivate these drugs, in their waste lands, which hardly requires any care.

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Small extraction pilot unit could be installed in the field, at suitable localities. The extract so obtained, could further be processed in the pharmaceutical laboratories for derivation of final products.

C) Cumin:

Cumin consist of the dried ripe fruits *Carum carvi* Linn and *Carum bulbocastanum*. Koch. These plants are quite common throughout Ladakh. The fruits of Cumin are largely used in Ayurvedic and Unani system of Medicine and the oil obtained from it is used for flavouring wines and soaps in perfumery.

The present position of import of Cumin is as under:

1970	1971	1972	1973	1974
Cumin Black				
Rs. 18,36,509	8,37,683	10,84,631	33,80,041	24,72,151
			1975:	18,24,401

The inhabitants may be encouraged for the collection and cultivation of the Cumin plants so that the demand of the country could be met from this region and the foreign exange will be saved.

D) Asfoetida (Heeng):

Heeng is an important commodity which is imported mostly from Afghanistan. Presently it is imported as under.

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Asafoetida:

1970	Rs. 46, 38, 663
1971	39, 05, 208
1972	34, 62, 656
1973	12, 37, 011
1974	62, 33, 875
1975	57, 357

The party collected information about the *Ladakhi Heeng*, the trade name which is quite prevalent in the market. On exploring the region for *Heeng* it was found that nowhere in Ladakh *Heeng* is extracted.

In Ladakh, two species of *Heeng* occur viz. *Ferula narthex* Boiss. and *Ferula jaeschkeana* Vate. The species which is found in Afghanistan i. e., *Ferula foetida* Regel., from which the gum resin is extracted by incision from the living rhizomes and roots, does not occur in Ladakh.

However, from the information collected it was known, that in Sonamarg and Gund, the places lying in Kashmir, people extract resin from (*Ferula narthex*) But, when places were visited it was found that *heeng* is not extracted in these places. As it is evident, from the important figures that several lacs of rupees are being lost in the foreign exchange, therefore the study of *Heeng* is worthy to be undertaken on the following lines:

1) Extraction of *Heeng* from *Ferula narthex* the species growing in Ladakh, and, its evaluation.

2) Introduction of Afghanistan species *Ferula foetida* into Ladakh.

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E) Other Misc. Drugs:

A number of drugs, were found growing in abundance in state of nature which are in great demand in large quantities by the drug industry and medical practitioners. Presently, these drugs are being imported from Nepal to meet the demand of the consumers, as the indigenous sources are not tapped fully.

Import from Nepal

Ephedra	500 quintals
Gentiana	100 quintals
Orchis latifolia	100 quintals
Rheum emodi	500 quintals

There are also some drugs like *Podophyllum emodi*, *Aconitum heterophyllum* and *Onosma* Sp. etc. which have either export market or largely consumed in the indigenous system, also found plentifully growing in this region.

Planned extraction of these drugs will not only save the foreign exchange but also act as a fillip to stregthen the economy of the Ladakhi people as well as the country.

In Ayurvedic and Unani system of medicine a large number of minerals drugs are used. *Shilajeet*, *Pinda-Hartal*, Borax, *Jahar mohara* etc., are a few of this vast group used in practice. These mineral drugs have been reported from many localities from Ladakh, *Shilajeet*, a valuable mineral drug is imported from Pakistan and Nepal. If technical know how of scientifically extracting and purifying of mineral drug is provided to the Ladakhis, it will certainly be an addition to their present resources, and foreign exchange which is being incurred for procurement of these drugs would be saved.

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PRELIMINARY TECHNO ECONOMICAL SURVEY OF NATURAL RESOURCES AND HERBAL WEALTH OF LADAKH

The Central Council for Research in Indian Medicine and Homoeopathy conducted a three month pilot techno-socio-economic survey of Ladakh area often referred to as "Dust bowel of earth". The team during its pilot survey collected details relating to historico-geographical information, social life, customs, food habits, disease incidence, traditional medical knowledge, medical systems, medical practices, medico-botanical wealth and mineral deposits, fauna of the area with an accent on the scope for minimising importing of raw drug material involving foreign exchange. The team surveyed Dras, Kargil, Leh, Chumathan and Nubra ranges and collected over 1000 plant species. The team visited a number of *Gumpas* which housed manuscripts dealing with subjects like principles of religion, culture, Buddhism medicine etc.

The reader will find that the present work is a succinct picturisation of this less exploited rich land which is capable of yielding plants, minerals, petro-mineral material and also a rich and medical heritage preserved in its pristine form. The findings reported in these pages may help in assessing the quantitative availability of the herbo-mineral wealth as well as in identifying new resources for the drugs which are being imported. This monograph which covers details ranging from anthropology to zoology, including flora and medical knowledge can well from a window of this rich area, Ladakh referred to as *"Land of Gumpas and Lamas"*.

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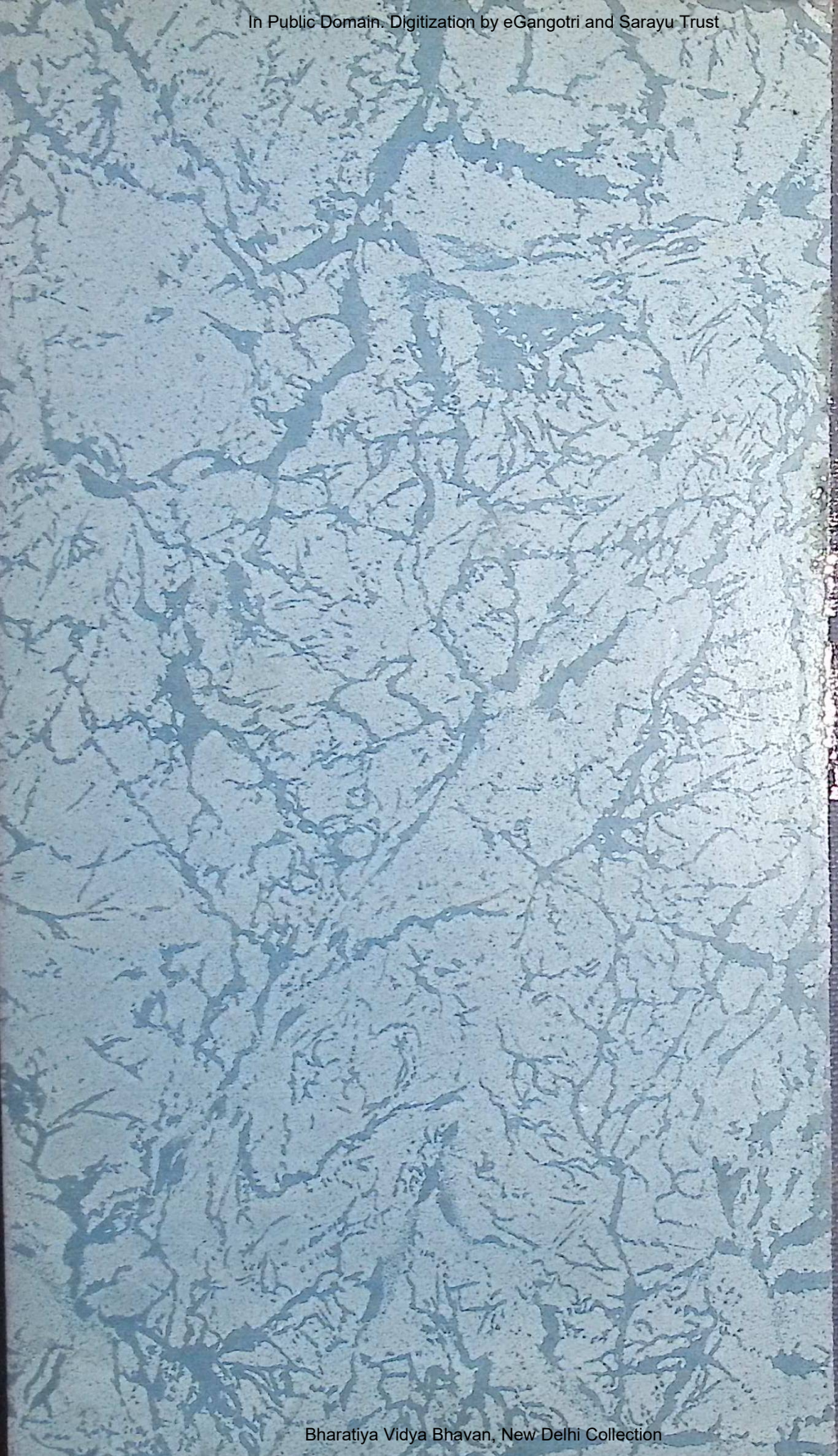

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